U.S. DEPARTMENT OF AGRICULTURE

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BIOPREFERRED
PUBLIC MEETING: COMPLEX ASSEMBLIES FORM

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Wednesday
February 24, 2010

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The public Meeting convened at the University of California, Riverside at 8:30 a.m. (PST), Ron Buckhalt, USDA BioPreferred Program Manager, presiding.

PRESENT:

RON BUCKHALT, USDA
CLINTON BOYD, Business International Furniture Manufacturer Association
JIM DARR, EPA (Remote Presenter)
STEVE DAVIES, NatureWorks
STEVE DEVLIN, Iowa State University
RICHARD DIAMONSTEIN, Paramount Industrial Companies
JEFF GOODMAN, USDA
LORA HERRON, General Motors (Remote Presenter)
JIM POLLACK, Omni Tech International
DR. RAMANI NARAYAN, Michigan State University
MARLENE REGELSKI-REDDOOR, EPA (Remote Presenter)
JESSICA RIEDL, Iowa State University
RYAN TRAINER, International Sleep Products Association
RUDY PRUSZKO, Iowa State University

C O N T E N T S

P-R-O-C-E-E-D-I-N-G-S

(8:30 a.m.)

MR. BUCKHALT: Good morning. My name is Ron Buckhalt. I'm the manager of the BioPreferred Program at the U.S. Department of Agriculture, and we're going to spend a good part of this day talking about complex products and how we designate those complex products for purchase.

And we're in Riverside, California, University of California - Riverside, and I hope I can advance the slide here to give you--all right, Jessica, give me a hand here. We have a slide that's not advancing. I'm not sure what's happening. What we have is the agenda for today--we hope. See what you can do there.

I have another copy, which I'll talk from while she's putting it up there.

We're going to have about five or six different speakers and topics. The first person I'm going to introduce, in just a

moment, is my boss, Jeff Goodman, who's head of the Environmental Management Division at USDA, and to whom we report, and I'll save the full introduction for just a moment. Then later on, we'll hear from Dr. Ramani Narayan from Michigan State University. We'll turn, then, to EPA, Jim Darr, and Marlene Reddoor, and hear from them.

Lora Herron of General Motors will make a presentation, and Lora will be on the Web, and we'll be viewing it here as if we were remote, because she will not be here with us in person. Nor will Jim and Marlene. We'll have a break around 10:05 California time.

Then we'll have a couple of different speakers. Clinton Boyd from the Business International Furniture Manufacturer Association. Richard Diamonstein, Paramount Industrial Companies. Ryan Trainer, the International Sleep Products Association. They're going to tell us their view of what a

complex product is and then how we should designate complex products. Jim Pollack of Omni Tech will bring things to a conclusion, early this afternoon, West Coast time. He with Omni Tech and he's done some really good work in life cycle, I've seen recently, and some other things. We've known each other for quite a number of years. He does a lot of work for the United Soybean Board.

So without further ado, I would like to introduce, and you probably can't see that, for those of you who are not here in the room, but there are a number of people who are with us here today who I'd like to give credit to.

Of course first is my boss, Jeff Goodman. We also have Steve Devlin from Iowa State University who heads up the program for us at Iowa State. Jessica Riedl who is walking there, with a black shirt on, and she's kind of the sidekick, "left hand," "right hand," or whatever--gets things done.

Rudy Pruszko, Iowa State University also. And Robin Brekke who is handling the AV for today, and the Webinar. Also in the room, as part of our staff, is Mike McAfee with AMA Associates.

So that's kind of the crew here, and thank you, to all of you, who made time to come out and be with us today. We do anticipate other people coming in as the day goes on. It's not the easiest place to get to, sometime, in Riverside. It's the inland-- what's it? the Inland Kingdom? Or Inland Empire, I think we said. But it's a lovely campus. It really is. A beautiful place out here.

So without further ado, I'd like to introduce to you my boss, Jeff Goodman, for a few remarks, and Jeff is one of those people who has a strange resume. He couldn't get into any other college, so he got into Harvard. So it's one of those type deals. And he couldn't go anywhere else to graduate

school, so he went to MIT. So it's a pleasure to work with Jeff, and he tells stories about that, and I'm not exaggerating, totally, when I say those things. But in any event, he's the head of the Environmental Management Division. He's also worked for EPA. He's done a stint on Capitol Hill.

So Jeff, I'd like to call you forward, if you would, sir, and talk a little about the program and what we hope to accomplish today. Thank you, sir.

MR. GOODMAN: Thank you, Ron. Good morning. Let me echo Ron's thanks for people to have made the effort to come to Riverside as well as those who are participating via Webinar.

Ron's asked me to spend a few minutes, to try to put into context, why we're here today and what we hope to accomplish, and let me begin by giving a very brief overview of our BioPreferred program, because I think that'll help explain our objectives for today.

The 2002 Farm Bill, that Congress enacted in that year, established our biobased markets program, which we call the BioPreferred program, and the program has two important components. There's a federal procurement preference program and there's a voluntarily labeling program.

Within the federal procurement preference program, Congress, in 2002, asked us to establish some program guidelines under which USDA would designate categories of biobased products for that federal procurement preference. We did that back in 2005, and those program guidelines are final regulations that are in full force and effect, and we have, under those program guidelines, been through five rounds of designating regulations, where we've designated some 40-odd categories of products for procurement preference program.

In 2008, Congress passed a new Farm Bill, and the new Farm Bill had some

additional provisions to it, one of which was that some of the intermediates and feedstocks, from which final biobased products are produced, should also become designated under this federal procurement preference program, and once so designated, some of the downstream products made from those intermediates and feedstocks would automatically be designated.

So our program guidelines, of course, that were developed in 2005, did not anticipate Congress's 2008 action, and so those program guidelines do not provide for the designation of feedstocks and intermediates, and the subsequent auto designation of downstream products.

So when Congress passed the 2008 Farm Bill, they, in effect, required us to go back and revise our program guidelines, so that we could be consistent with the new law. And this public meeting is part of that effort to revise the program guidelines.

In addition to the fact that we

had to do it to meet congressional mandates, the guidelines are also almost five years old, and given that we have to go back and change them to meet that congressional mandate, we also wanted to try to take advantage of the five years of experience that we've had with the program, to try to make some revisions and refinements, to reflect our experience as well as the new legislative requirements.

And so what we decided to do was look at some of the key issues that we felt we had to face in the revision of the program guidelines, and we identified three major issues. The first, of course, was that process to designate intermediates and feedstocks per the legislative mandate.

But we also wanted to ask the question of how we could open up our designation process to complex assembly products. And the reason that we did that was our program guidelines require the determination of biobased content as an

integral part of the designation process, and right now, there is no formally-approved, agreed-upon methodology for determining the biobased content of complex assembly products.

As a result, under our current program guidelines, we are unable to designate complex assembly products for preferred federal procurement. So we wanted to try to open up our guidelines and address that issue as well.

The third issue that we wanted to address was the whole question of life cycle assessment, because it's been a somewhat controversial one over the five year course of our program's history.

So given that we have limited resources and intelligence in Washington, we wanted to try to open up the information avenues, to try to collect information from people who had a lot of thoughts to share, and so we decided upon a strategy of having three public meetings, one to address each of those

three issues.

And so today's meeting is to talk about the complex assembly products, and our goal here is to try to see ideas and inputs for how we should determine the biobased content of those products, so that we can include them in our designation process.

We adopted, on our program guidelines, the ASTM standard for determining biobased content of biobased products that are testable in the lab. At such time in the future, as there may be an ASTM standard to address complex assembly products, I think our program guidelines will embrace that standard. But until that time--and you'll be hearing more about that later this morning, from Ramani Narayan, about the development of that ASTM standard--but we're looking for kind of an interim solution for our program guidelines.

The other benefit of coming up with a methodology for complex assembly

products is with our voluntary labeling program. We have proposed regulations last summer for a USDA-certified biobased product label that would on a variety of biobased products that were qualified.

One of the key pieces of information to qualify for the label would be the determination of biobased content. So if our program guidelines can establish a methodology for that, it would then open up the voluntary labeling program to those complex products.

So by coming up with that methodology, we sort of get "two bangs for the buck," one on the federal procurement preference side of the BioPreferred program, and one on the labeling side of the program.

So that's why we're here today, and we're anxious to hear your ideas, and with that, I think I'll turn it back to Ron.

MR. BUCKHALT: Thank you, Jeff, for that introduction. We appreciate that. A

couple of other items before we introduce our next speaker. Ramani, if you want to make your way forward, we'll get to you in just one moment, sir.

On January 5th, we had one of those meetings, those public meetings we talked about, that Jeff talked about, the LCA, life cycle analysis, or environmental analysis, or whatever you want to call it. A meeting in Washington. We're still accepting comments on that. But the transcript of that meeting has been posted online. The transcript of this meeting will also be posted online. I just want to let you know that you can get this at a later date and review what was said here today.

This is a Webinar, so you're going to be able to ask questions. There is a place in there that you can get in line, if you will, to ask questions. You won't see your question, you'll see that you've submitted it, but you're not going to be able to see it

until we actually ask the question. On the Webinar page, you see up there is a Submit Question Here. I think that's pretty straightforward. So you write your question and submit it. And in terms of questions, we're going to try to take a couple a questions after each of the speakers that are on some "burning issues." We would like to hold a lot of it to the end, so that we don't run over too much on time.

So, in any event, I'd like to welcome our next speaker. Dr. Ramani Narayan, and Ramani, I've got the change of the clicker right here, sir. Just hit the advance right there, so you'll be in good shape.

Dr. Narayan, we've known each other more years than either one of us would like to admit, and he has more hair than I do, so you know it's been a while. He's a university distinguished professor in chemical engineering and material science, and chairs the ASTM Committee on Biobased Products and

Biodegradable Plastics for Michigan State University.

Welcome, Dr. Ramani Narayan, who knows more about ASTM than I will ever learn. So thank you very much, Dr. Narayan. So here we go.

DR. NARAYAN: Good morning. Good morning to all. I'm going to be talking about, as was mentioned, the biobased carbon content of complex assemblies; right? So let's get started right--so that we can spend more time on the slides.

I want to start off with this generic BioPreferred program which I picked out of the Web site, and the reason I bring this up is to point to a couple of things.

One, I want to talk about the first three words which appear there, which is renewable biobased farmers, and then, if you go further down, the BioPreferred program is supposed to offer three major benefits, which is climate change, energy, environmental

security, and economic development. All right.

To this, now I add the following. So if I talk about climate change impact reduction, it talks about reducing CO2 emissions. If I talk about energy environmental security, we're talking about reduced dependence on petro feedstock using biorenewables. If you talk about economic development, you're really targeting rural farm and forestry-based industries. The point I am making here is that is all wraps around biobased carbon, really, cause that's what the linkage to all of these is.

So with that kind of direct introduction, while this is a generic way, I want to get into the specifics of the science behind this. Okay? So the value proposition which I offer then for biobased, can be biomass or renewable products would be the following.

Switching the origin of a

product's carbon from a petro fossil to a bio carbon reduces the carbon footprint. So if you go back to the BioPreferred program and relisted everything, we're basically talking about changing the feedstock, switching from a petro-fossil feedstock to a biorenewable feedstock.

And if I get more specific, I'm talking about changing the origin of the carbon from a petro bio, a petro fossil to a biorenewable feedstock. Okay.

So these three points just illustrates, again, what was put up as the generic BioPreferred program outline; right? Using renewable biomass feedstocks as opposed to petro-fossil feedstock--remember, this was targeted to energy, environmental security--reduced heat trapping CO2 emissions, which is directly related to minimizing global warming climate change issues, where we are saying replacing the petro-fossil carbon with bio carbon will do, and the third one is economic

development which is empowering rural farm forestry and the like manufacturing industry, again tied into this concept of utilizing biorenewable feedstocks. Okay.

So that is the value proposition for biomass, biobased products and feedstocks.

So let's go further and explain this in a much more concise manner. What we're talking about here is that if you look at the structures shown on your screen, I have polyethylene, I have PLA, and I have a generic carbon, hydrogen, oxygen, nitrogen, whatever you want, structure.

What I want to point is two things. One, we're trying to replace the carbon, the element shown in red, which is today coming from a petro-fossil feedstock with a bio carbon feedstock. Okay.

Two, we're focusing on organic materials. In other words, we are not focusing on inorganic carbonates. We're not focusing on water; we're not focusing on

nitrogen, which are all, maybe, important issues. But we're focusing on carbon. That is the mandate of the BioPreferred program as it was initiated. This is a much more; I would call a scientific concise description.

So we're talking about replacing carbon. Okay. And therefore, what is the impact of this substitution in terms of the three points we raised--CO2 reductions, security, and rural development? That's what we have to ask.

Now there's a second component to this which I call process carbon footprint, and it was alluded to earlier. This is that when I take the feedstock and convert it to a product, there is an impact on the carbon emissions, there's an impact on water, there's an impact on other environmental impacts; right?

But it does not capture the basic value proposition for a biobased product, which is replacement of petro with bio carbon.

Clearly, this is important. This is where LCA plays the major role. Sometimes in the life cycle assessment methodology, the material carbon footprint is incorporated into it; sometimes it is taken out of it. But it does not mean that this should not be done. But I just want to separate the two roles, to clearly bring out the value proposition the switch is going to give us; right?

So yes, you need to look at carbon emissions from all stages of unit operations. You are going to look at the material carbon balance, which is the LCI life cycle inventory analysis. You're going to look at the impact on the environment and I know you're going to hear a lecture on that, later on. But I want to separate it.

I want to give you a value proposition which is much more, simpler, easier, and I'm a simple-minded person, you know, not just a typical professor. I don't want to throw in a lot of different silly

questions. So I want to a farmer, like, you know? I'm going to give you a simple value proposition which everybody can understand, and which is replacement of petro with a bio carbon; right? That's probably why I'm at USDA meetings. They don't invite me at the ACS meetings, these days, anymore.

[Laughter]

DR. NARAYAN: The last component of course is, this is--we are talking carbon, which is very important, but it's also the environmental--so you can't just focus on global warming. You have to focus on, also on depletion, eutrophication, acidity, all of the other impact categories.

The problem in this is where do you draw the line? Which impact category? How do you select it and how do you go about it?

So those are issues which need to be dealt with, but what I am proposing is a clear demarcation between material carbon

footprint, its value proposition, and the process carbon footprint, which also must be taken into account. But I would argue that the substitution is more from a material perspective, and if the process stays the same, or better, then that is good, but that should not be the end-all in this equation.

So terminology then becomes important. So let's define certain things here. So the term is what do we mean by a biobased--in Japan, they call it bio-mass based. In Europe, they call it renewable. DuPont calls it renewable resource. I don't know what NatureWorks calls it. I think they call it PLA, period, I guess. But biobased and the definition is very simple. It's an organic material which contains, in whole or part, biogenic carbon, carbon from biological sources.

It's very simple. It ties into all the things we have been speaking about to date.

So then we need to define what is organic material. But when we talk about biobased, of course these two we have already addressed in length. We have first biomass, or crop feedstock. New carbon. This is the petro-fossil carbon. It talks about reduced carbon footprint.

What is an organic material? Now this is well-known. We took organic chemistry in high school, and you'll notice that all my points is at the high school level. That somebody told me if you can write a paper which addresses a 7th grader or 8th grader, then it must be very, very clear and transparent.

So that's the rule I'm following here, trying to bring it to high school chemistry and high school biology here.

So an organic material is basically a carbon-based compound in which the carbon is attached to other carbon atoms. But fundamentally, when we talk about biobased, we

must be very clear, especially we're talking now of complex assemblies.

When we're talking about a complex assembly, we're not addressing silicon or we're not addressing glass, or silica, or whatever other elements which goes into it. We're talking about carbon-containing compounds, organic, and we're talking about the substitution of that carbon from a petro fossil to a bio carbon. That's all we are talking about. And the value proposition it offers from a material carbon perspective. The value proposition it offers from an LCA perspective.

That's how we want to define this. Okay?

So if I define biobased material, then I need to also then define--how do I define a biobased content or what--in parentheses you know this is carbon content. Now whenever we talk about biobased content, I want to emphasize that we are talking about

carbon content. We are not talking about hydrogen, we are not talking about oxygen, nitrogen. We are not talking about weight, which includes all of the above. We're talking about carbon, because remember, that's what the BioPreferred program listed--reduce CO2 emissions, energy security, rural, which is all related to bio carbon. So that's why we're talking about bio content.

And you can read the definition, but very simply, it is the ratio of bioorganic carbon to total organic carbon multiplied by a hundred. That is the biobased carbon content. So it is a ratio of bio carbon to total organic carbon.

And the beauty of this matrix is the fact that we have a standard which can measure this accurately, transparently, independently of whatever the product looks like, or is composed of. Okay? And that is the ASTM standard. We'll talk more about it later.

But I want to emphasize here, and I'll reemphasize there, ASTMD6866 test method gives you directly, the biobased carbon content, which is the ratio of bio carbon to total organic carbon. It's unitless. It gives you that ratio directly. It doesn't give you bio carbon by itself or organic carbon by itself, which is going to be very important when we get into complex assemblies. Okay.

So let's look at the terminology. What's the difference between bio and petro carbon, because this, I think, is the root, the base for all that we are talking about. And we're talking about--I go back to high school biology, or biochemistry here.

An organic carbon present in the atmosphere as C02, photosynthesis, light, gives you organic carbon. That organic carbon is biomass, agricultural forestry crops residues, new carbon. Now the rate and time scale of this C02 fixation to biomass is one

year if you plant a crop. The next year it could be a plantation, which you harvest every ten years. You harvest twenty years, doesn't matter. But it is a managed biomass plantation, whether it is annually like you do for crops, or it is a longer time period like you do for woody plantations or other kinds of energy crops, for that matter.

This organic carbon is fossilized over millions of years to fossil resources. We call this oil, coal and natural gas. So the first submission is let's not provide a value proposition for the biobased product as being natural, because fossil is also natural. It didn't come from Mars. It was right here in this planet, and it is a part of the same biological carbon cycle.

So calling something natural has no meaning because petro carbon is also natural.

Calling it organic, like we call organic farming and all, is also not

applicable because petro carbon is also organic. In fact, that's the fundamental definition of organic chemistry, and that's our fundamental definition we use.

So we must be very careful with what terms we use. So I'm not talking about organic because both are organic. I'm not talking about natural because both are natural. There's got to be another value proposition, and the value proposition has got to do with what I call the rate and time scales.

So the rate and time scales of carbon fixation to fossil carbon, to oil, to natural gases in millions of years, the rate of use and releasing back to the environment is in one to ten years make it twenty make it thirty; it doesn't matter. Remember that the global warming potential is measured on a 100 year time scale. So we're talking big numbers here, right? Just like our debt today; right? Billions and--so the rate and time scales is

in millions of years. The rate and time scale of our use and releasing it is in one to ten years or one to twenty years. Simple math. This is not sustainable. Okay.

If we manage the same carbon, so instead the rate and time scale of use is in millions of years, we're okay, we're fine. So what do we do? The solution is, then, if you use biomass carbon, which has got a rate and time scale of carbon fixation in the one to ten year frame, then, if you use it and release it back, then we are in balance.

I'm not saying it's exactly equal. I'm not saying its carbon neutral. But what it is saying is that by using biomass-based carbon feedstocks, renewable carbon feedstocks, the rate and time scales of carbon fixation is in balance with the rate and time scales of use and release back to the environment.

That is the fundamental material carbon value proposition which I want to

communicate, which has got nothing to do with the process of converting this to product, which has got its own implication of what energy you use, what emissions you put out. That's a different story.

But this, in itself, has got a great value proposition and fits in very well with the BioPreferred programs, clear enunciation, right up front on what its goals and mandates are.

Okay. So that is what I call the material carbon footprint. Now I want to translate this in real terms, in real numbers, right? Because we want to make it as simple as possible; right?

So let's ask the question: If I have 100 kg of polyethylene, today made by fossil resources, how much C02 is released into the atmosphere, and what is the impact of just switching the petro carbon with bio carbon?

Remember, I'm not talking the

process of making polyethylene. I'm just saying if I have an opportunity to switch the carbon, what will it make, what is the difference it's going to make? I can ask the same question for PET, which is what is compromising all your pop bottles; right?

What happens if I switch all the 10 carbons of PET with bio carbon? But let's as a much, a little bit more complex question and say, What if I replace only two of those ten carbons which you see on the structure with--what--is there an impact?

Now these are not abstract examples because both of these products are in commercial market, or supposed to get into the market soon. The first one is Braskem and Dow going from sugar cane to polyethylene. We call it bio-polyethylene. The PET is Coca-Cola announcing that their plant bottle is going to contain 20 percent bio carbon content.

Or they have any value

propositions to this, because if there is, then this is exactly what the BioPreferred program is trying to pull through in the marketplace. Okay? So simple stoichiometrics. I promised you to be at high school level. This is what it is. Twelve grams of carbon gives you 44 grams of C02. Right? You studied that. If you have not studied that, you have to go back to high school then.

So if I have 100 kg of resin, and polyethylene, you've seen there is two carbons, there is four hydrogens--you can calculate percent carbon there. It's about 85.7 percent carbon. What does it mean?

If I have 100 kg of polyethylene resin, I have 85.7 kg of carbon present. If all of that carbon was petro carbon, it would give out 314 kg of C02 emissions. Very simple, right?

If that petro carbon is replaced with a bio carbon, like in the case of bio-

polyethylene, or the whole polymer is substituted by another bio-derived polymer like PLA, then I have eliminated 320 kg of C02, not because these products don't release C02. That C02 release is fixed by the next crop you plant, or the next plantation you have.

So therefore, a material carbon emission is fixed and neutral. So I can say that by substituting the petro carbon of polyethylene with the bio carbon of polyethylene, or a bio PLA, or whatever, then I have eliminated 314 kg of C02, which incidentally does come up in the LCAs, and is there, but in that mass of numbers it's just a "drop in the bucket" and nobody even notices it; right? That's what we're talking about.

Now if I took PET, making a much more complex question, because there are many people out there who are saying, Do I have to replace all of the carbons, or can I get away with two? Or what's the best available today?

So as we said, if you look at PET, there's a total of ten carbons. Two of them come from a glycol component. Eight come from an aromatic component. We won't go into the chemistry. But all of ten, too, is bio. Very simple. That means it's got 20 percent bio content.

Okay. During that simple math of stoichiometry again, if I substituted 20 percent of the bio carbon into a PET product, I can get 20 percent C02 emissions reduction. Well, you go out and tell somebody you have 20 percent C02 emission, even the most technical of audience, What does that mean? You know, how much real C02? How do I grasp my hands, or wrap my hands around it?

So this has now been converted in what I call communicating and presenting C02 emissions reductions data, and the first message is if I look at the total PET usage, it's 37.5 million metric tons, and I just replaced two of those carbons. Then I get an

annual reduction of 17 million metric tons.

You can actually show numbers as to how much reduction I achieve to replace it. Of course in the conversion to that, you don't have--you should make sure that you don't put more C02 and remove it. That has to be taken into account.

But starting, you are going to do that; right? Now to visualize the C02 reduction in practical, ready-to-understand terms, you can then translate it again, using simple stoichiometrics. But then, you know, the EPA has put out this calculator and I know you'd believe the EPA more than you'd--if I told you these are the numbers.

So let's use the EPA calculator and say if I had 17 million metric tons C02 reduction, how does that translate to? And it translates to something like this, which even a non-scientific layperson would understand.

That replacing two of the carbons in a 10 carbon PET pop bottle, I will save 40

million barrels of oil each year. I'll save 3 million passenger vehicles, so on and so forth. You get the message, that these are readily translatable, that there is a value proposition in this material carbon footprint substitution.

Okay. So the key to all of this, then, is at the top of it. If I do not know how to measure the bio carbon content, absolutely, then all that we have talked about is theory. If I give you a product and said, trust me, I am saying you this is polyethylene, and the other guy says, yes, mine is also bio-polyethylene, how are you going to tell the difference; right?

Now if we all were honest and truthful, we wouldn't have a problem. But we know better than that; right?

So we need a measurement technique, or a methodology which can absolutely check this. And fortunately for us, it is offered in terms of nuclear

chemistry; right? And I'm pretty sure in high school, they teach you this too.

So if you take nitrogen-14 in the atmosphere, cosmic radiations convert nitrogen-14 to radioactive carbon-14, which is oxidized to 14, C02.

So in the atmosphere, C02 is in dynamic equilibrium with radioactive carbon. Okay. The half-life of radioactive carbon is 5,700 years. Therefore, any bio carbon will have a radioactive carbon signature associated with it.

So if I can burn it and measure the radioactive carbon signature, I can easily quantify and tell you accurately, what my bio carbon content is.

Fossil resources are formed over millions of years. No bio carbon content. There is no radioactive carbon signature associated with it.

So this allows us to codify it into an ASTM standard, this 6866, which forms

the basis for all the biobased content calculation.

I want to go into this in a little bit more depth in my next slide, because this becomes very important for complex assemblies. Okay?

So how is this measurement done? It's a very simple methodology. I told you, I like simple things, so no complex complexities here. Take a product, burn it, it gives you C02. Take that C02 and measure the radioactivity. There are three different methods. We won't go into it. Compare that carbon-14 radioactivity to an oxalic acid standard, which was pre-1950 wood oxidized oxalic acid, and compare the radioactivity.

If it has the same amount of radioactivity, it's 100 percent bio. If it has 50 percent radioactivity it's 50 percent, and so on and so forth. So the absolute value, for those of you looking for actual numbers, is 14.27 disintegrations per minute,

per gram, is the absolute value of the primary oxalic acid standard, which is SRM4990B.

Actually, we are even more accurate. We use 13.27 disintegrations per minute, per gram, because, you know, during 1950's, we had all these nuclear explosions. So the amount of radioactivity in the atmosphere is higher. So we have what we call is the "bomb correction factor" for that as well.

So if we can measure this, we got the factors done--

MS. RIEDL: We have a question from an online participant.

DR. NARAYAN: Oh, wow. Okay.

MR. BUCKHALT: Do you want to take it now? Or let's wait? Is it really pressing? Or can we wait?

MS. RIEDL: We can wait.

MR. BUCKHALT: Continue, please.

DR. NARAYAN: So keep the slide.

So the--contains concentration of

C-14 isotope which is equal to 100 percent bio carbon content.

Anyway, the important note here is--and this is the critical point to be noted here. That the ASTMD6866 gives you directly the biobased carbon content, which is the ratio of bio carbon to total organic carbon. That's what it gives you. It takes up the C02 and does that. Okay.

But it doesn't give you the exact--if you have 50 grams of PLA, it doesn't tell you how much bio carbon content of that PLA is. It just gives you the ratio of the two. So to calculate percent bio carbon present in the product, you have to take the biobased content experimental value and multiply it by the organic carbon, which is obtained by standard elemental analysis, multiplied by the weight, to give you the actual percent or the weight of bio carbon present in your product. Okay.

This is to be very clearly

understood, because what you get is the ratio directly. Say if I want to take the ratio and calculate the weight of, or the amount, or mass of bio carbon present, I have to multiply by the organic carbon present in it, so on and so forth. Okay.

So if I take this concept into complex materials, if I take this--if I take complex materials now--so hopefully you've got the idea. I can measure biobased carbon content efficiently. That accuracy is plus or minus 3 percent. I can take any product, constituent, burn it, get the C02 out of it.

Now what happens to complex materials? And this is what Jeff alluded to earlier. I have a beverage bottle. It has got three components; right? The bottle, the cap and the sleeve.

How do I say what's the biobased content of it? No, actually, that's easy. I take the cap off, I take the sleeve off, I can do it.

What about a computer? Do I have to burn the entire computer and then calculate biobased carbon content? How do I report these things? And that's what was again alluded to in the complex assemblies. What about automobiles?

It's multiple components. Then how do I look at it? It's got organic; it has got inorganic. How do I differentiate it? And if we don't have a clear protocol, or a method, or a standard, then everybody's going to do it whichever way and there's going to be total confusion in the marketplace.

So clearly, the BioPreferred program has articulated the most important point is how do you calculate these, and there are many products. And this is what I am trying to bring out.

So this is a standard we are trying to develop in ASTM, and there's some sort of definitions which go with it. So bio carbon, we already talked about it, is a

carbon containing concentrations of C-14 isotope, which gives you 14.27 disintegrations per minute per gram. If you have that, you have 100 percent bio carbon content.

Organic carbon is carbon present in organic compounds. We already defined that. Now I want to change constituents, components, and integrated components. Those are the three elements.

What we want to say is that a product, whether it's an automobile or a computer, is made up of components. Those components are made up of pure individual constituents which comprise that component. All right.

Therefore, if we divided this into three, then I can sum it up, mathematically, to give you the biobased content of product. Let me explain that, and if you want, we can take this a little slower.

So this is the simple one-slide math. I told you, everything has got to be

very simplified. So if I took and asked the question, what is the biobased carbon content of a complex product, BCC product? Okay. You guys can make it simpler or easier that way.

Comprising "i" constituents. So any product has got some constituents with it, and who's biobased and organic content can we experimentally determine?

So if I have a bottle, I can take that, I can get the composition of the organic and the biobased. I have the cap. I can do it separately. I have the sleeve. I can do it separately.

If I have an automobile which has got a bio foam in it, I can do the bio foam, I can do all the other organics, and I can get the component.

If I have five components which are biobased, then I can do the same thing.

So all I need to do is to break up the complex materials into its constituent materials, which comprise that, which I can

take out and experimentally determine for biobased content and organic content. That way, you split it up into it; right?

Then it is very simple. Then that biobased component, content, is equal to the submission of "wi" which is the weight or mass of the "i" component multiplied by the biobased carbon content, which is experimentally determined by ASTMD6866, multiplied by the organic carbon component, which is also determined by ASTM. Okay.

And you divide it by the submission of the weight of the submission of all of the "i" components into the organic carbon component, and that gives you--that ratio will give you the biobased carbon content of the product.

That is all the math that's needed, if you can split it up and that should not be a problem.

So I don't think that the complex materials issue is complex, if you break it

down into its modules.

Now there will always be exceptions, and I'll be shocked if somebody didn't come up with something that says you can't do this because--but most products lend itself to this kind of a exercise.

Where there is no--remember also, this is where the value comes. If I have silicon, if I have glass fiber, they're not included in my biobased calculation because this is dealing specifically only with organic materials. This directly dives into the BioPreferred program's values, which you listed out there.

So we're talking about organic carbon-containing material. We're talking about the bio carbon in that organic material, and how do I add all these together to give me a total value, and how do I do it in a way which is transparent, reproducible, and everybody does the same way?

Now there are some more things in

the standard, which will be how many triplicate, duplicate experiments you will do. What about minor constituents like 1 percent and 5 percent? Would you take that into account? All of those small details will come into play.

But I think this is my submission to this group on complex material, is to de-complex the material into its individual constituent, which is a constituent which you can determine biobase. So if I have PLA in my computer, and nothing else there, I can determine the biobased carbon content of the PLA, if it is 100 percent PLA, or if it's 60 percent PLA with something else.

There are a lot of these blended components which are finding its place into these complex parts. You determine that and then you say, What about the rest? Remember, the denominator is all organic and the weight. So you know your total you will always get. It's not eliminated out. Okay.

So that is the summation. This is the simplest way one can do it. We will codify this into an ASTM standard in the next couple of months.

A couple of key things which will come up, which is where we think we would need input, is what is the minimum organic content of the constituent? Should it be--so we have put 30 percent? There's no "hard and fast rule." It's arbitrary, in the sense that if I put the minimum biobased carbon content as 20, then I must have enough organic carbon to divide the numerator with the denominator, so I must have at least thirty. That's how that's been put up there; right?

But it could be 25; it could be 50. Now the Europeans pick 20, because somewhere in their European Union guidelines, it says that the European Union will reduce their C02 emissions by 20 percent; right? You remember the material carbon footprint. If I was 20 percent bio carbon, I can reduce it by

twenty.

So that was the basis on which they talked about it. Okay. So I think I'm running out of time.

I want to show you, typically, that we do this, a lot of the "grunt work" and basic work here. But everybody else in the world adopts it much faster than we do, is just a submission to the USDA that--so here is Japan. They actually have--I don't know you can see it well--but there is a C02 reduction label in there. That C02 reduction is based on the same standard I talked about, which says, okay, I've replaced the petro carbon with bio by this amount. Therefore I've reduced my C02 material carbon by this.

It doesn't talk about if the product, in making this product, I put out more C02, put out more water, created more environmental hazards. That's possible. But we're assuming that that's not happening; right? Therefore that is an important

component to do, but you can't hold the biobased switchover to ransom because of this complexity into that. That's my point I want to make.

And this one is very important. In fact, all that I've spoken is now being adopted by the European Union. So Belgium--this is the AIB Vinçotte. They now give a actual certification which they call "OK Biobased." Now I know we are talking about voluntary labeling here. It's already there, and there are companies who have already gotten ahead with this labeling. And look what it says.

And I paraphrase two of the quotes which they have.

On a basis of the determined percentage of renewable raw materials, your product can be certified as one--they use the star, again taken from the Energy Star program which the EPA had put together--so it's a one star, two star, three star, and I never

thought this was a good way, but they said that's what captures the public's attention.

And one star is a 20 to 40 percent biobased content. Two star is 40 to 60, three is 60 to 80, four is above eighty. Okay. And that's 20, 40, is all biobased carbon content as per ASTMD6866. All right.

The second one, they categorically say this--now this is the European Union where LCA is supposed to be the bedrock of everything; right?

In contrast to LCA, the investigation method behind the "OK Biobased" certification is very simple, and the exact value can be precisely and scientifically measured and calculated.

This renders checks and rechecks very transparent, and also allows apples to be compared with apples with the greatest ease. That's really what you're talking about. That's what the program was meant to do. That if I substitute with bio, and if I want to

compare one bio with another bio, here is a very simple way to do it.

I don't need an LCA to compare with a product, bio A is better than B, just on a material carbon footprint; right?

And they're doing it for raw materials, intermediates, and finished products, exactly the methodology I just explained to you, it's in their calculation.

So, in a way, I contributed to that, I've taken it back to put it up here, but I wanted to tell you that this is already happening in both Japan and in Europe, and this agency has taken the lead role in that. And Germany is also following the same methodology. So I think there is precedent to do this kind of things.

I want to address this process carbon footprint, because I don't want to leave people with the impression that, okay, I do my bio carbon, and everything is done, and we can go with it. But I do want to emphasize

some things here.

One is that the carbon footprint from conversion of feedstock to product, the cradle to factory gate, and total environmental footprint, is to be calculated using LCA methodology, and you're going to get an example of that, in gory detail, I presume, later on.

And that end-of-life scenarios can give you skewed and misused LCAs. For example, if I assume that a PLA biodegrades in a landfill, which probably doesn't, given what the landfills we have, but it produces methane. So you are 23 times worse than C02.

I show all my PLA going into a landfill and going to methane. I make PLA look terrible after all; right. This is--LCA is made available in the marketplace. No worry that it was not meant to go there, or it really doesn't biodegrade. Nobody cares. But conceptually, it is there.

So if I, as a manufacturer, do not

know where my product is ending, and then I'm held to delivering an environmentally-responsible product, that's going to be difficult.

So the recommendation would be that we don't talk about LCA as the end goal, but LCA as a tool or a methodology to report on the process carbon and process environmental footprint from cradle to business gate or factory gate, because that's what you control.

And that would give a very good example for everybody to "do their thing," to improve their environmental sustainability that exists, without getting into this debate, well, that is wrong and this is wrong. Okay. And--like transportation. Okay.

So I will skip this for want of time, and I'll be happy to take questions. I covered this in my last lecture when I did it in Washington. Thank you.

MR. BUCKHALT: And you have a

question that came in via the Web, which was some time back. It's one of the high school chemistry questions.

DR. NARAYAN: Oh, this is a beautiful question, because--I didn't forget it but I was hurrying up so I didn't--

MR. BUCKHALT: Thank you for your presentation. You've tried--there's a lot of information there. But you tried to make it simple for us who only took high school chemistry.

DR. NARAYAN: The question was: How does locking a fossil carbon into non-degradable plastic cause release of C02? An excellent question. This has been asked many times.

What if I don't burn it, because we say it is going to be burned into C02? What if I put it all in a landfill and simply preserved that garbage, without letting it break down at all? We won't debate the value of whether that is good or bad. Let's assume

it is possible, and since these plastics will not degrade in a landfill, they've pretty well taken C02 out of the system.

Then my submission is, if you take a look at this slide, instead of releasing 320 kg, or 340 kg of C02, you'll be at zero. Absolutely true. But if I make a PLA, or if I make new bio- polyethylene, which sucks 314 kg of C02 out of the atmosphere, then I'll be negative C02 in material carbon.

So either you put the baseline as zero, and then it is 314, or you make 314 a zero, in which case that's going to--you have been making polyethylene the first time around, you did use up--you did take up fossil fuels, which was 314. So you'll go negative because you have sucked C02 out of the atmosphere.

So that's the answer to this question. But I will submit that there is no way that this is a 100 years, the global warming potential is measured on a 100 year

time scale, and if we are just preserving these plastics in a landfill and not releasing it, that doesn't seem to tie in with the sustainability concept of the cycling of carbon, so you must burn it to recover energy, or you must recycle it. But you can't continuously recycle it forever. So somewhere down the road, you are going to burn it or do something worthwhile with it.

But even granted that it goes into a landfill, then you're at zero. But then in making these products, I am fixing more carbon and therefore I get this value. Okay.

MR. BUCKHALT: We have one question, here, from the audience, and then we'll move on.

MR. DAVIES: Thank you, Rod. Steve Davies. Great point. I just want to add, though, that in that example of PE going in a landfill, we can't ignore the process carbon footprint. In converting and making the PE, there was an emission of typically 2

kilos of C02 per kilo of PE to the atmosphere, just to get it in a landfill.

So it's not net-net neutral. There's still a positive contribution to global warming. One point. The other point, I sort of feel compelled to go on record and just make it's in the transcript, that what you hypothesized around PLA behavior in landfill is indeed exactly correct. It does not degrade and generate--and we've gotten in quite a bit of trouble using organic waste systems in Europe, OWS, to do ASTM testing, to show that in the last year. So I didn't want any misconceptions around PLA behavior in landfill.

DR. NARAYAN: No, that's absolutely correct, that data shows that the landfills, you know, PLA within soil takes time to degrade, so in a landfill it doesn't. But the perception, that because it is called biodegradable, therefore it's going to break down in a landfill, which an anaerobic

environment, and therefore extrapolated to the fact that it gives methane, therefore it is bad, and therefore PLA is bad.

It's the mathematical one into zero equals two into zero; therefore one equals two.

MR. BUCKHALT: Instead of twenty-two. We could discuss this subject all day, obviously, and I've been in meeting with Dr. Narayan, and we have discussed this all day. Some of our meetings we've had. Let's take -- yes, let's turn you off there, so we don't get feedback.

Thank you, Dr. Narayan. We appreciate your comments, and folks, we appreciate your questions. Let's give him a hand.

[Applause]

MR. BUCKHALT: We've got a couple of speakers standing by, who will be broadcasting remotely, like we're doing here, for the folks who are the Webinar. Again, the

transcript of today's meeting will be online. We are asking that you please give us any comments that--if you do not get your question answered, or you want to comment, sometime within the next 60 days to biopreferred.gov, so just do that, we'll be glad to have your comments and make them part of the record.

Again the questions, if you're asking a question, you're online, it will not show up in the window until we actually ask the question.

So without further ado, let me introduce the next two speakers for today. They are from the Environmental Protection Agency.

Marlene Reddoor has 27 years of Government service, at EPA 23 years, and U.S. House of Representatives. She served for four years. She's worked in legislative, regulatory, and American Indian and small community environmental program development and implementation as well as information

management. Currently, she manages the RCRA, the Resource Conservation Recovery Act, comprehensive procurement guideline, and develops outreach and educational materials for Green Government, the federal environmental stewardship initiative, and leads a successful Office of Solid Waste, OPP, Potomac Yard Green Team, the model for the EPA environmental stewardship. She has a master's in international relations and cross-cultural communications from the School of International Service at American University.

I'm also going to take this time to introduce Jim Darr. I'm not sure who's going to go first, but we're going to use Marlene's picture up all the time because Jim is camera shy, so he didn't want his picture up. So Marlene, you get to star here.

Jim Darr. Jim and I have actually been in a number of conferences together, and have worked together with the National Sanitary Foundation in putting some green

cleaning standards together. So he and I spent some considerable time at Ann Arbor in the past.

If you hear a noise in the background, they're mowing the grass out here. They have green grass in California, folks, unlike us people back on the East Coast. So a little bit of noise in the background, it's a lawn mower. Sorry about that.

Jim's education. He has a BA in chemistry from Western Maryland College, studied toxicology, epidemiology and risk assessment at the Massachusetts Institute of Technology, through the EPA Institute. So another MIT person here.

From 2000 to the present time, he's been a chemist in Pollution Prevention Division, Office of Pollution Prevention and Toxics at EPA. His duties include a variety of activities related to development and implementation of EPA's environmental preferable purchasing program, and we do, with

the BioPreferred program, have some relationships with that program.

So I'm not sure who wants to take the lead, whether it's Marlene or Jim, but I'll turn the microphone over to you guys.

MR. DARR: Okay. Thanks, Ron. I guess I'll start out, and, well, the fact that you have Marlene's picture is a break for you guys, so we'll just leave that picture up there. Just by way of a little bit of background, I probably should have made a slide or two on this, I think probably a lot of folks are already familiar with the comprehensive procurement guideline, but for people who might not be, it's the federal preferred procurement program for recycled content products, and Section 9002 of the 2002 Farm Bill, which mandates a biobased products program, was really modeled on Section 6200 of Resource Conservation Recovery Act, or RCRA, which set up, you know, the recovering materials program many years ago.

So there are a lot of similarities between the two programs. You know, they both designate products. They both specify content levels. So the idea with this presentation is to take a look at the CPG's experience and see what lessons learned in that program might be relevant to the biobased products program.

I think what Marlene and I are going to do with the presentation is I'll briefly kind of introduce the major issues and some of the overall advantages, disadvantages, and then she'll speak, in greater detail, about examples from the CPG program that illustrates those issues, and as Ron mentioned, she's the CPG program manager, so is in a good position to do that.

Well, one of the first questions you run into in these kinds of programs is, you know, what to designate when you're talking about complex products. Do you designate the whole product? Do you designate specific components or materials within the

product? You know. And there are advantages, disadvantages, to both approaches.

Probably the main advantage in terms of designating a whole product is that, you know, it's simpler and it's more familiar for consumers. People think in terms of, you know, buying a chair, you know, not buying the seat cushion part of the chair. Or buying a car, you know, not buying the dashboard, etcetera.

So it's kind of simpler for consumers and it's the manufacturer's usual marketing approaches. I should scroll down again. Sorry about that. We need to get on the right slide here. Sorry about that.

And typically, you know, manufacturers market the whole product, not some part of the product. Of course there are also disadvantages to taking the whole product approach. There can easily be misunderstanding of what the content requirements actually mean, both for

manufacturers and for purchasers.

You know, which components or materials do the content requirements apply to, you know, when you've designated the whole product? And also I think--you know, I'm not sure how much of a problem this is, but, you know, at least comes to mind, that if the relevant component or material of the product is a very small part of that whole complex product, you know, that may sort of hurt the credibility of the whole--you know, the designation.

People may wonder, well, sort of what's it matter? you know, we're just talking about, you know, a tiny fraction of this product which is relevant to the designation.

Now Marlene will talk about, you know, a few examples in the CPG program, where they have designated, you know, a whole complex product.

MS. REGELSKI-REDDOOR: Mostly--hi. Nice to be here today and I'm glad to be able

to do this. When we designate products, products are like office furniture, playground equipment, building insulation, laminated paperboard, and one that still hasn't finished its designation, that's been just a preliminary rule, has been sent out, is carpet. And that's the one I kind of know actually best.

We designate them by percentage of total weight, and that was done way back, when the CPG program started in the early '80s, and that has been an oIngeoing thing. Nothing has been changed for the CPG program as far as the methodology and the way we're supposed to be doing it, established back then.

Office furniture. Obviously, we have--the other thing that was decided back then was not to designate materials but to designate products. So that if--California is a little bit different. They designate materials that can be used and recycled. We designate just products with certain material,

and it's just based on weight.

Carpet--do you want to talk about that now or later?

MR. DARR: Sure.

MS. REGELSKI-REDDOOR: There's been--it was originally designated in 2002, I believe, and we haven't been able to come to an agreement, or we keep getting more information on it, because the percentages--carpet has backing and it has fiber facing.

In nylon carpet, you can reuse the nylon and you can reuse some of the backing, and melt it down and disassemble it. But in order to make some of the weight, the percentages larger, based on the weight, it was told to us, as best we know, we don't--we haven't confirmed this--but some of the problems came around when people were adding filler, filler in the form of calcium carbonate, that didn't add to the recyclability nor to the general betterment of the carpet, although it was structural fill as

well.

So they were adding things--they were purportedly adding things to get the percentage of recycled material higher as opposed to the quality of the carpet, or the--just to get that higher percentage, because CPG does say that the Government must buy the highest percentage of recycled content that is available in the market. That's--

MR. DARR: Yes. We can--

MS. REGELSKI-REDDOOR: You can probably go on to the next one now.

MR. DARR: And then of course the other approach besides designating the whole product--and as Marlene mentioned, for the most part, in the CPG program, they've designated whole products rather than specific component material, which you can designate specific component material.

Some of the advantages to that--well, mainly, it's just, I think makes the content requirements more straightforward, you

know, that the contents apply to this particular component of the product, so there's not that confusion. You know, one or--you know, a few components, or it's the whole product, or what is it?

You know, disadvantages are--and again, as mentioned before, maybe--the components for certain products might be less recognizable to purchasers. You know, again, purchasers usually think of the product as a whole, and also, with the manufacturers, that can create some challenges for them in how to sort of prevent and market the thing, because, again, they normally market, you know, the whole product rather than a component.

So those are things that they would have to think about, you know, in going with the, sort of the component approach.

There are a couple CPG examples where, you know, a component rather than the whole product has been designated, and Marlene already talked a little bit about--

MS. REGELSKI-REDDOOR: Polyester.

MR. DARR: --the carpet. You want to say some more about these particular--

MS. REGELSKI-REDDOOR: Well, it was--at the time, back in the late '90s, it was polyester carpet that could be divided between the face fiber and the backing. So that I believe the face fiber--it was two different processes, and you could have it as either. So we designated each of those.

MR. DARR: Yes, the two different types. Yes. And I think the backing isn't--is mainly just recycled carpet, sort of whole carpet product that can be recycled into backing.

MS. REGELSKI-REDDOOR: Yes.

MR. DARR: And again, whether--another big issue. You know, whether you designate the whole product or a component, then a separate question is how do you specify the content? And again, you know, that can be specified either as a percentage of the whole

product--in other words, even if you only have a certain component that's relevant to the recovered material or biobased material, you know, you could specify the content in terms of the whole product, or in terms of that specific material or component where it's relevant.

MS. REGELSKI-REDDOOR: Again, the example of carpet, as Jim was saying, it was being recycled back into carpet, but it was the backing, not the facing, that the whole carpet was being recycled into, the whole material.

MR. DARR: And some of the advantages of specifying as a percentage of the whole product is--I mean, it is simpler for purchasers to understand. I mean, in general, unless you explain clearly to them, otherwise, when people see like, you know, recycled content percent on a product, they assume it applies to the product as a whole, unless you're very clear about specifying that

it's only a particular part of that problem, and there are a lot of sort of case studies of, you know, misunderstandings in that area.

There are disadvantages to doing it that way as well. I mean, it can be complicated for manufacturers to calculate, especially, you know, if it's a complex product where they're getting components from different suppliers, can be a difficult problem for them. It also can result in very small numbers in terms of what that percentage of recycled content is.

And yes, you might get to where, you know, people just kind of discount it because it's such a low number, that, well, who cares? So, again, you know, it can be sort of a credibility issue. And then of course the alternative is specifying the percentage according to the specific component or material that's relevant in the case, and that's usually less complicated for manufacturers, again especially when they have

to get permission from external suppliers, which is for most complex assemblies, that's probably the case, unless you had a manufacturer who's very vertically integrated.

Disadvantages are that--I mean, it can be, you know, hard to explain, in a clear way, to purchasers, you know, they can easily get misled, and this other disadvantage, it kind of applies to simple products as well as complex, at times.

In obtaining sort of recovered material stocks from different suppliers, a lot of times, that percentage varies from time to time. You know, it's not like it's always 25 percent. There may be a range, you know, within material from one supplier and especially across different suppliers.

So it's sometimes, then that presents problems in calculating, you know, what the content actually is. And now we have a number of CPG examples for having the content specified according to the particular

component, and, you know, as you can see here, there are a number of cases like that. You know, Marlene will talk about those a little more.

MS. REGELSKI-REDDOOR: Nylon, well, PET, all these different ones that are here, we gave different percentages, depending on--we gave percentages because they were--okay. Often, it depends on where things come from, what part of the country you're in, what stock materials are available, whether or not you can produce each of your components--I don't know--I don't know where to start here. Sorry.

In factories and things, there are different carpet factories in different parts of the country. There are different materials that are made in the East, the West, the North, South, and the stock are very--the supply for the stocks, we're calling--this is "supply and demand"--are very different in different parts of the country.

So we can't specify that the factory in Georgia will be able to make the same amount of percentages in each of their corresponding runs as a place in California or Missouri.

So we have the percentages that will run a range of how much is available at any time, so that the Government purchasers will have a range of material that they, produces they can buy, rather than specifying just one place. And it's very hard, even as different loads come in, or different times of the year to get these same percentages at the same time in each of their runs, their factory runs, their manufacturers.

So it becomes a problem to--for supply, and regions, to get the same amount of stock, which I've said three times. So that's why we usually have a specified range.

MR. DARR: And we can probably just go to the next.

MS. REGELSKI-REDDOOR: Yes. And

these are just examples of what's been done--playground equipment, plastics, different ones made with different composites, different materials.

MR. DARR: Yes, and another thing that might be worth--you want to go back one, Marlene.

MS. REGELSKI-REDDOOR: Okay.

MR. DARR: It might be worth noting, with playground equipment--the office furniture illustrates it as well--I mean, you can specify components in terms of kind of a functional component, you know, like the frame of the chair. But you can also do it in terms of the material. So with playground equipment, for example, you should say, you know, any plastic in there, whatever its function, you know, whether that's part of the frame, you know, whether that's the feet--you know, whatever it is--you know, that should be a 100 percent recover material.

You know, any fill in it, you

know, whatever the function of that fill, 25 to a 100 percent. So that sort of illustrates different approaches as a component. They're sort of, you know, what's its function in the product? But also just sort of the type of material approach. So those are some things that might be relevant, at times, for the biobased program. We can go ahead on forward. Then I think this is our, it's the last slide, which is sort of, you know, what--Marlene already talked about this, some units of measure.

In all cases, CPG uses weight percent, probably for the reasons stated here. I mean it's generally well understood, you know, easy to calculate. You know, sometimes, you know, with complex assemblies--I mean, there are some disadvantages, in that if you have materials or components in there, you know, greatly different size or density, I mean, you know, weight percent, you know, can be somewhat of an "apples and oranges" thing

then, and, you know, takes some explaining to people.

But, in general, that's what has been used in the CPG program. Again, these things, like sort of filler materials, and water, in calculation, can come up at times, probably not as much in the complex products, probably more in simpler products like a chemical formulation where, you know, maybe 95 percent of its water. But those are things that need to be considered at time.

And so I guess--Marlene, did you have any other comments? Those are all the slides we had, except for, I guess, for our last one, which gives our contact information. People can feel free to not just ask us questions today, but, you know, follow up at any time.

MS. REGELSKI-REDDOOR: I'm sort of here for questions but I think we've covered most of the things that are entered into the process that we consider. I have some

specific examples but I don't think--another one we didn't mention was color and absorption.

Some of the things, like in fabric, that have come from recycled fibers, absorb color at different rates, and if you want a red, you have to have less of recycled and maybe blue. So that's another kind of complex thing that you have to consider when you're looking at percentages, and how much of a material can be--the recycled content can be put in.

MR. BUCKHALT: Jim and Marlene, thank you very much.

MS. REGELSKI-REDDOOR: Do you want to answer any questions or--

MR. BUCKHALT: We have a question coming in back here. One moment. Go ahead and ask that question, back there, in the back.

MS. RIEDL: We have a question from an online participant, Dorothy Allen.

Her question is: How does CPG requirements compare to the EP for computers, TV, and IE referenced in Executive Order 13514, where biobased plastic content standards are very low or are optional?

MR. BUCKHALT: Which one of you guys is bright enough to take that? Do you want us to repeat it? It's in the chat mode, so you can see it there, written down.

How do CPG requirements compare to the EP for computers, TV, and IE referenced in EO 13514, where biobased plastic content standards are very low or optional?

MR. DARR: Biobased materials, you know, they're chemicals that are prohibited or limited in certain ways. You know, there are kind a energy requirements that are referenced in it. So there--it's probably not a good answer for the question but there's--I'd say there are really different types of things, where CPG doesn't specify, you know, parameters in those other areas. It really is

just the recover material content. So I mean, it's a lot more like the biobased program in that respect.

MS. REGELSKI-REDDOOR: Right now, the CPG program doesn't have any electronic products that it specifies recycled content for.

MR. BUCKHALT: There is a movement in this area, however, to replace a lot of the petroleum-based plastics in the units that make the computers, or the telephones, or Blackberrys, to use a bioplastic which will then be recovered, we hope, at the end of the life of that particular electronic product. So there will be more and more of that entering into the marketplace.

Steve, you have a comment on that. You want to take Jessica's phone back there--her microphone.

MR. DAVIES: I guess I was, just had a question if they had any insights related to the issues of the whole recycling

industry as a whole. I mean, one of the things that always comes out whenever we talk about biopolymers is how is it going to impact the recycling industry, and I just was wondering if they had any thoughts from that standpoint. I mean, cause we talk about complex products. There are systems in place to recycle certain plastics but not to recycle other plastics, and so what are their thoughts there?

MS. REGELSKI-REDDOOR: Well, I think you kind of answered your own question. Right now, the technology is barely emergent to tell the difference between the bioplastics and the regular plastics. But I believe it is emerging, and that has been always our concern, is that okay, these are bioplastics. Then we either need them to be able to have then compost in a commercial composting facility, or some way not put into landfills, and stay there because their stability is not that much different than--I'm just talking

plastics here--than regular plastics, once the polymer is constructed. So they're pretty sturdy.

And it is an end of life--we kind of disagree with our first speaker. That end of life is--can't really be ignored in any of the products that we manufacture, because they all do have an end of life, and we want to make sure that they're disposed of responsibly, and we like to work from the very beginning of life, not to the technology and the people who are creating the products, rather than to wait until you have to retrofit some sort of a way to dispose of them, environmentally.

MR. BUCKHALT: Marlene, I hear what you're saying and--

MS. REGELSKI-REDDOOR: You want to say anything else, Jim?

MR. DARR: No.

MR. BUCKHALT: Jim, did you want to say something?

MR. DARR: Oh, no, no. I didn't have any further comment.

MR. BUCKHALT: The fact is that right now, the regular petroleum plastics, we're only recycling 30 percent of them. Let's be real. I mean, the recycling program's come in for a long time, and we're in the process of figuring out to recycle these biopolymers, and I know that that's a little bit different situation, in that you take a petroleum polymer, you can only take it down, you can't take it back to the same product it was before.

So I'd ask Steve Davies if he'd comment on that.

MR. DAVIES: I sense a setup here, Ron. Thank you. Ron knows that we have a lot of passion around this subject. So Steve Davies with NatureWorks. I'll just give you a quick perspective, strictly from the point of view of bioplastics, as of right now still the world's biggest producers of what we call

INGEO, polylactide.

Ron said it. Really, the numbers are--the only plastic that is--thank you, Ron--that is recycled at all, today, is bottles, and those only to the extent of 25 percent, and the reason that other plastics are not really recycled is the backend economics simply don't work very well. It's much cheaper, unfortunately, today, still, to produce virgin plastics from petroleum with the consequential environmental burden of the carbon footprint of those.

I think where bioplastics play well--and Ron said this--it's the whole basis for the BioPreferred program, is in the here and now, they immediately offer a lower carbon footprint. They drop in to all existing infrastructure, a bioplastic, pretty much any bioplastic going into the recycle stream today is pretty well just going to end up where most plastics end up, unfortunately, which is landfill.

It's a sad fate, but still, in that case, you've sequestered carbon that was in the atmosphere last growing season. It's now locked up as the backbone of the plastic and it's in a landfill, and at least for our plastic and gel, we've gone to some trouble to show what it does in landfill, and answer that question, which is an important one, which is does it degrade or not? It does not. So I want to be very careful with the facts on this one.

Anything else, Ron?

MR. BUCKHALT: I appreciate that.

MR. DAVIES: Well, one last point.

MR. BUCKHALT: Okay; go ahead.

MR. DAVIES: I think the comment was made that the technologies are still not emergent for separating these plastics, and they are. I mean, near infrared is well-established, it's with all the big recyclers today, it is what is used to pluck out PET bottles and extract value from them, and Coke

is very good at this, and it's invested in this space, because they're obviously heavily invested in PET.

The issue isn't whether the technology exists. It certainly exists. It's the scale. There's often not enough of these new bioplastics out there yet, to yet warrant them being separated. That's changing, though. Very shortly, you will see buyers emerging, recyclers emerging, who want to buy those bioplastics out there, because there are tens of millions of pounds of bioplastics out there already today in the recycle stream, and there are folks recognizing the value and the ease with which those plastics, specifically the one we know well, INGEO, polylactide, can be turned back into a virgin polymer by turning it back into lactic acid, repolymerizing it, so it's true recycle, not down-cycle.

I'm got on my soapbox here. But an example.

MR. BUCKHALT: That's the point I wanted you to make, Steve. Thank you. It can go right back to the same thing it came from, whereas petroleum plastics go down. Thank you very much, Marlene. We appreciate that. Jim, it's a pleasure, as always. Thank you folks for participating. We look forward to hearing more from you as we move down the line.

MR. DARR: Thanks.

MR. BUCKHALT: Thanks again.

Let's move on to the next part of--go ahead, Jim. Jim, do you have something else?

MR. DARR: Oh, no. I think Marlene and I are both going to try to "hang in here" on the phone for at least most of the rest of the day. So I mean if questions in our area come up later on, feel free to call on us.

MR. BUCKHALT: Wonderful. That's terrific and we really appreciate that, and appreciate your time this morning, and I guess

its afternoon there, but thank you very much.

Let's move on and get our--our next speaker is also remote. We're looking at a lady from General Motors, Lora Herron. We're okay getting Lora up, I hope, there, and Lora is the bio and recycled materials engineer for General Motors Company. She's a graduate of Michigan State University.

Was she one of yours, Ramani, one of your students there? Probably. He produces a lot of them.

She has a bachelor's degree in chemical engineering. In her time with GM, Lora has worked in materials testing laboratories with JD Power issues at an Oregon assembly plant. In her current role, she increased recycled and bio content within GM's various vehicle platforms. She's been published in the New York Times and featured on multiple Web sites for her work with GM's use of green materials.

She'll be providing an automotive

viewpoint on how to handle complex assemblies within USDA's BioPreferred program. Lora, take it away.

MS. HERRON: Am I coming through?

MR. BUCKHALT: Yes. Yes, we can hear you. We can hear you, Lora. Go ahead. Speak up, though.

MS. HERRON: Thank you so much, and yes, it is--I am "guilty as charged." I am one of Dr. Narayan's students, which was always a good time over at State. I'm going to talk to you today about GM's perspective on the complex assemblies with the BioPreferred program. I'm going to try to keep this "short and sweet" for everybody, and please jump in and tell me if I'm "tech-speaking" too much, cause we have a nasty, nasty habit of having too many acronyms, and things of that nature, here, within General Motors.

So let me give you a little background. I'm going to talk about what our current material approval process is, so you

know kind of how things work here. Specific automotive material challenges. We put our materials "through the wringer." We have to have interior cabs withstand some of the heat under--you know, radiation from glass--that it's amazing, what our materials have to deal with, without melting or fading, or burning, or anything like that.

So we had some really tough requirements. What our current status is, what we kind of look at is the green analysis, and the previous two presentations were fantastic, they led us beautifully to what I want to talk about, and I'm in agreement with what both of them said. That was perfect. And then talk about where we feel the status options are for the BioPreferred status for complex assemblies such as vehicles, our recommendations, and then we'll do a quick little wrap-up.

Okay. How do we currently approve materials? This is not just for biobased.

This goes for all materials.

So we start with a material, and we do perform an extensive testing sampling plan. Typically, our suppliers handle that, the actual resin suppliers who are supplying the material, not who are supplying the part.

They do it--it's six lots of data for us, typically, with, you know, plus and minus three sigma, so we ask for a lot of data, up-front, so we can predict how this material behaves, so that we can predict and deal with failures, and understand why the material's behaving how it does.

And we do this basically on the physical property testing. Once that testing's complete, then the material will be approved to a GM specification, and then it will be targeted for an application.

So once we have identified in our application what part we want to make out of this material, and which program or platform we're going to put it on--are we going to put

in a Chevy, GMC, a car, a truck? Where's it going to go? Where's it going to live. Then we validate at a component level. So then we take that material, now we know how the material behaves, mold it, and see how it behaves once it's molded, or assembled, what have you, and make sure that that performs to our requirements as well.

So internally, biomaterials--this goes for recycled too since I have both, I can't be too partial--biomaterials would be given a preferred status based on application, so where can we use it? and what the other options are for that application, what the actual material is, and the cost. It's the same factors as our current materials.

That's pretty much how--that's usually how we handle those things. Examples of current bio applications. We actually have balsa wood in the Corvette flooring, and they've done that, I think, for over 15 years, and it was originally done as a mass savings,

which helped from the other end, reducing your carbon footprint by light-weighting your vehicle so you get better gas mileage.

So it was actually a double bonus with the sustainable forestry practices there.

We also have some natural fibers in our headliners, specifically new Equinox, they were in the Trailblazer and Envoys as well, and that's a kenaf fiber, and the hollow nature of that natural fiber lended itself beautifully to acoustic benefits, that added surface area was great.

So is actual, an additional benefit to being green there.

Cadillac XLR has some real wood interior trim, several of our other up-level models have that as well. That's pretty much basically for the aesthetic benefit.

Specific challenges that our materials face. There's a lot of them. Number one, we have cost issues. It's very hard to recover capital investment and

research on the bio right now, and a lot of that is related to some of the other things I've got listed here, including the infrastructure. We have--well, for bio, there's low volume right now, and you have your economies of scale when you start--you know--when you shop at Sam's versus, you know, shopping at your local "mom and pop" shop, that's the kind of thing we're dealing with.

You can buy huge quantities of material, you can obviously get it for a better rate than when you're buying ones and twosies, little tiny brackets here for a small-niche program just to get the content in.

So we're dealing with that and trying to work around that, and one of our ways to work around that is if we can get additional property or performance out of that material. So say the biomaterial, and it costs a little bit more, but we can actually get another benefit such as it is more

durable, or reduces mass, or reduces VOCs, or something of that nature, then that lends itself to another business use.

Right now, we need cost-effective materials. They have to be priced at current production or lower than the petroleum-based competitors that it would see. I get--as an engineer, I get in trouble with Purchasing when I go over there with a cost increase. They don't like me, they send me away when I do that. So I have to come in with a business case, and I can come in, like I said before, higher, if I've got something else to bring to the party.

We have actual and perceived quality issues. We have the physical property requirements that are extremely demanding. Then there's biodegradability issues. In our durable goods market, biodegradability is a bad thing.

It would be great if it was in a controlled environment and we could say after

250,000 miles, let's do it, let's get rid of it. That would be fantastic.

Right now, the technology to make that kind of thing happen is very few and far between. We don't want anybody's cup holders to degrade if you spill hot coffee on them. Customers get a little bit angry when they have to go back to the dealer for that kind of thing.

You also have your appearance and comfort issues, some, like the foams, for instance. When you increase your renewable content, you can also increase the durometer. You make it stiffer. If you're going over a pot hole, you don't want to bounce and hit your head on the ceiling every time you hit a pot hole because your foam's a little stiffer. They're working on ways to incorporate more renewable content and they're making huge strides.

But that's just an example of a comfort issue because of the different content

of the bio content. Then obviously are safety issues. Safety is huge. We can't--it's the bottom line. We have to have--our quality has to be there. We cannot compromise quality for our customers, just to be green. I mean, I'm all for green, I have biorecycled, but we have to make sure we're doing it for the right reasons.

Mass production, like I mentioned before, the goal is to minimize the mass to minimize fuel consumption. Natural fibers lend themselves to that. That's great. Some of the biopolymers, and like was mentioned earlier, you're dealing with different densities, and that can actually be a detriment, but you're getting the green content, so you have to weight these things out.

We want green because we want to reduce our environmental impact. We don't want green just to have green. We want it because it's actually better for the

environment and better for our consumer.

You can put coatings on biomaterials and make them hazardous waste. You can do that with virgin material. You have to be very careful. We want it to be an entirely greener process, and that takes--it takes the whole process, the whole life cycle into account. We can't--we have to have--our vehicles have to be made a certain percent recyclability and recoverability at the end of life. We expect that of all our components and all of our parts within that vehicle. And I'm not sure about some of the other complex assemblies, but I would imagine they have similar requirements there.

As a global company, that's an additional challenge, right there, because there's climate variation. You have arable land, mass variation, and you have specific regional legislation because certain crops could be--could be as invasive crops, or things like that. We have to be careful. We

can't--you know, we're not going to--you actually put more C02 out shipping, you know, a biosourced material from one continent to the next, necessarily, than by growing it there.

Well, if you grow it there, then you have these other issues if--you know if it's, you know, in upper regions of Canada, well, you're going to have a lot more snow.

If you're, you know, in the deserts of Australia, you have those issues to deal with. So, you know, we've got plants and manufacturing sites all over the world, and as a global company, trying to globally source materials to minimize our impact, you have to be careful with it, with bio. The infrastructure. Infrastructure, like we just touched upon with the previous presentation, is still very, very new.

And that happens with every new technology. But it's especially dangerous for us with that required recyclability and

recoverability rate.

A lot of the materials, with the biomaterials, are recyclable, and that's fantastic. And you cannot design a material, go in without it being recyclable. So obviously, such as the PLA, it is recyclable

The problem is if no one's doing it, then is it actually, for a car production vehicle, is that actually greener or not? So these are some of the things we have to think about. We don't want to intentionally send anything to the landfill. We want to be able to recycle it. When the infrastructure's not there, that's an additional challenge for us. We need help with that from our suppliers and sometimes even from outside entities.

And then you have your infrastructure, your quantity of material. We demand millions of pounds of material for even some of the basic parts, just because of how many vehicles we produce.

Sometimes the biomaterial may lend

itself beautifully to an application, but the plants that are--the companies that are making it actually can't make enough to supply us for the full production run. So that is a capacity issue that obviously, with your economies of scale, will get better.

Current status. We are very interested in following the developments of biomaterials. That's my job. I try to implement them wherever we can. We want to encourage the further development. I'm working with several different suppliers, trying to get projects up and running, and I have different avenues. Sometimes, if it's too far out of the box for our current production materials, I can send them to our advanced design group. They can keep an eye on things that may be five to ten years down the road.

So we don't just, you know, "blow them off," or, you know, ignore them. We actually maintain it, that type of field right

there, and keep an eye on the technology because we want to know, we want to use it. We have to do it, wherever it's technically and economically feasible. That's pretty much our--if it works, if it's quality, and if we can do it at usual cost, or at cost reduction, that's when it happens, that's when we can make it happen.

The specific roadblocks that we're dealing with are the technical issues. Like I say, a lot of the--at least initially, a lot of the biopolymers were having issues meeting our heat requirements, the heat deflection temperature was a big problem.

Right now, the way a few companies are managing that is by making hybrid materials and mixing the bio with the, a typical polyethylene, polypropylene type polymers, and then they can bring up the properties where we need them.

So that's very recently, recent developments, and that's very, very

encouraging. And like I said before, the cost hurdle with the economies of scale.

We've actually done studies because, you know, we're actually concerned, well, there are these green consumers, and pretty much at least, you know, my little naive self, believe that most people would do the right thing for the environment, given the choice.

However, based on the studies we did, we did workshops out in LA, we did them in New York, we did them in--I believe we did one in D.C. as well, and the desire to be green does not equal willingness to pay more. They did a--within the study, they found a few categories where you had a niche market trying--who wanted like, almost like an "eco luxe" brand, a super-luxurious, you know, Cadillac type vehicle with all these different green amenities, and that small, small few was actually willing to pay more for it.

The rest wanted either, you know,

either bare necessities, but they wanted it cheaper because they were taking it all the way down to bare necessities, or they wanted it at cost-neutral, just to be blind changes to them, but actually be able to feel better, like kind of a guilt-free thing by using a, well, I'm driving my car today but it's made out of these green materials, so then I feel better about it. But it doesn't look like it, it still feels and smells and looks just like the regular materials, if you will.

So as far as green analysis, okay, now we know what GM does, how can we do this? How do we determine the actual bio content? We are in complete agreement Dr. Narayan about carbon dating is the accurate and concise way to prove old versus new carbon.

The issue that we have with that is the supplier's cost is huge, even if it's just, you know, maybe around $800 per test, because that's about an average of--if one of our suppliers sourced out a lot of material to

an outside test lab that's certified, that's about an average test cost.

That's one lot of material that's been tested. Now just in the functional black plastics group alone, which are kind of your brackets, your hidden things, your under-hood pieces, pieces that are covered or flocked, may provide structural support but you don't see them in interior or exterior--there's over 3500 parts alone, and that's just in that one kind of polymer--or one kind of category, if you will.

So when you're doing this testing per part, well, then you've got the different suppliers who are approved to that part, and if you're getting those--this is kind of where we're getting into a bit of a Pandora's box here. Now, okay, well, then are we testing every part? Okay. Well, then do we test every lot that's required to supply that part for the lifetime of the platform?

You can quickly, quickly add up

lots and lots of dollars, right there. So how can we do this? So we're trying to think of options, and including leveraging the suppliers who get that initial test done for the initial certification per GM spec, like we would do for typical material, and then after that, maybe after that initial six lots, or whatever is approved, at, say, 20 percent bio content, and then that supplier is held accountable for maintaining that agreed-upon level of bio.

We could do things like that. That's up to the, you know, obviously up to the USDA, on how they want to, you know, mandate that, but that's kind of an option, we were thinking, that might actually bring down that cost a bit.

And then one of the points that was brought up by the other speakers, too, is how much bio content is needed to qualify a part? If you've got an extreme part or material, and you can actually get .5 weight

percent in it, but that's a huge break-through for that part, does that not count? Or does it count? It can go either way.

There's pros and cons to do either option. So this needs to be published. So whatever we decide, or you guys decide as the minimum content, as long as that's published, then everybody can say, look, no matter how much effort we put into this plastic, we're only going to get .5 percent, and it's not the 5 percent that's required, so we're not going to mess with bio in this plastic or this polymer application. Then they'll go on to other options. That can be done, or just by having that little bit, it counts, well, then you're going to open up more avenues for people, are going to be interested, and they're going to be trying to experiment with many different things, which obviously has its pros and cons too.

So how do we determine the actual benefits or detriments to the environment? We

agree that the life cycle analysis is necessary. Like I mentioned before, green can be a detriment. It is recyclable but it's only currently being recycled as concrete filler. Problem, in our opinion.

That's not all that green. If it's--because obviously, like we talked about, in the growing part of the life cycle, plants that are being used as a bio content, you're going to have a negative carbon footprint, which is fantastic.

In the process, you should be right about the same, and the life, that could--that is a significant factor. That's where I've found, with my internal analyses of different materials, sometimes recycled materials are greener than the bio, not through any fault of the bio, but just infrastructure-based, and that is a challenge that definitely has to be overcome.

So one option we thought about was perhaps, you know, the USDA, or other INGEOs

might be able to help us with the analysis from a specific plant level, such as is corn versus sugar beet greener?

You know. And by "greener" I mean specifically, when you have your impact indicators for your life cycle analysis--water table, arable land, land mass, you know, your global warming potential--which one needs more fertilizer? Which is going, has greater potential to damage the water table?

Both are kind of things that--that doesn't exist, that data isn't out there. So if we could get our hands on that--and not just General Motors--but if everyone would have access to that kind of data, you'd have a much better chance of seeing the big picture and determining which way to go.

So the way we see it is pretty much exactly like our previous two presenters were talking about, the whole content versus specific materials, and we would actually vote for certification on a vehicle actual level.

But this is--let me break it down a little bit further. But with Path A, how we saw it is you have your weight percentage of bio content per part, per component. For instance, say we have a bracket. You can actually determine the pounds of bio per vehicle.

So say you have this part--no, let's not use a bracket, that's a bad one because it's so small. Say we have a front bumper. That's a pretty heavy part. Okay. And we say we've got it 80 percent bio. So now we've got an 80 percent bio part, and that relates into, I don't know, maybe 15 pounds. So 15 pounds of your entire vehicle is bio.

So you'd have 0.2 percent of your pounds on the vehicle is bio content. It's very, very small. And this is what we were talking about earlier, where the general public, most of the consumers may not understand the valiant efforts required to get that high a content in those one or two parts.

So if you focus all your research dollars on one or two parts, or components, and crank up the green content, can't get your "bang for your buck" on the marketing end. How can you--how can we make this worthwhile, or make the consumers even understand the effort that was put in?

But there are pros to it because it's an actual number, and then you can't question it, there are 0.2 percent, by weight, of bio in this car. So it's a number. It's there. Nothing wrong with that data.

Path B is the other option, where you have your percentage of polymer parts that have bio content. So this is where you could save 40 percent of the polymers in a vehicle--or 40 percent of your plastic parts in the vehicle have bio content. That's an impressive number. That catches the consumer's attention.

Now you don't want to mislead them, because if each one of those parts only

has 0.2 percent content, then that may be construed as misleading.

However, our argument for that is to get in all those different applications, to get in your fibers, to get in your fabrics, to get in your foams, to get in the durable plastics--that takes several different, you know, research avenues, several different plastics, they have to be, you know, analyzed and dealt with, and alternatives created. That's a technical challenge. Actually getting all those different applications is harder, technically speaking, than cranking out the content in one specific area.

So you would encourage the development in multiple, multiple polymer arenas just by doing that.

And that's kind of what our thinking was. So once a bio content has been introduced on those applications, increasing the content is much more achievable. So now you've got 0.2 percent in this part or this

polymer. Let's crank it up to five, let's crank it up to fifteen, and keep going, see what happens, see what pixie dust or additives we need to put in there, and make it better, make it work.

Getting it in--in the first place is the hard part, and if we can do that, then I think we have a better opportunity to make a significant impact. So our recommendation, like I said before, was the certification on the vehicle, or assembly level--we're a pretty complex assembly ourselves. I think probably the aerospace guys "have a leg up" on us, but otherwise, we're pretty high up there for complexity. Decide on a minimum weight percentage for qualifying the bio content.

Like our previous presenter said, the weight percentage sometimes can be very, very small. However, when you do, like Dr. Narayan was talking about, the percentage of carbon, your general consumer will not understand that, and that can be misleading.

We've actually dealt with that. I had to deal with that, internally, with some of our designers being almost green-washed by some of the suppliers, and that was very frightening. I didn't realize that--you know, I pointed out we need to compare apples to apples, and so you have to--when you take it down to the individual account, that helps level the playing field a bit. And we would vote, if you will, to raise the bio content of the Path B, where you have your percentage of your polymer parts that contain the bio.

That way--it's a bigger number but actually opens the door to many more opportunities. And then once that bio content is established, then you can, you know, award preferred status on a variety of different metrics, such as, you know, A, you'd go with your assembly, with your most parts. And then once you have, say, three or four different models that are tied there, then go with the highest content within the parts.

And then another part of that matrix would be environmental benefits per the materials chosen. So now you're bringing in your LCA. Okay. Well, we've got these two parts, both with the exact content, they both have 20 percent. This one's 20 percent agricultural waste content, and this one is 20 percent sugar cane. So can you--you know, which one is better for the environment? That's where you need your LCA, to determine that. And then you can also, you know, incorporate social benefits per the materials chosen, and go from there.

And once those are established, and published, then everybody knows the targets we're shooting for.

If everybody's just guessing, it's not going to happen. If we can get targets out there that are reasonable, and we know, like, okay, you have a minimum. Once that minimum is established, then we can work to it, and we will work to it. That's kind of

the goal as far as I'm concerned.

As far as labeling, that was a question that was asked of me earlier, was how do we label? That's a very, very good question. There's a lot of stickers required for our vehicles, and the group here would get really mad at me if they knew I call them stickers.

But the actual labels--we have state requirements, we have federal requirements, we have international requirements. So they require these different labels in several different places on the vehicle.

It's actually very, very costly to try to keep track, because certain states don't want labels that other states require, for aesthetic reasons, or whatnot.

So that adds cost, by trying to figure who's got to go where, where is this vehicle going? It's actually kind of a logistic nightmare.

There aren't many other options, though, to a, you know, to a stereotypical sticker. Maybe being marketing-based certifications or publications. Maybe inclusion, owners may know--and then I can see as pro or con, is sometimes things get lost in the owner's manual.

I frankly, for one, have never read my owner's manual and I'm okay with that. But what about Web-based information? What if we went to gm.com, and they pulled up their 2010 Equinox, and all of a sudden, damn, one of the things that came up was the USDA BioPreferred icon, and, you know, it said that--whatever the label would be--and it was right there. So they could check, you know, before purchasing their vehicle, or determining when they use their vehicle, what does this--does this have BioPreferred status or not?

And it would be available to them. And it would be available to everybody, not

just somebody who was sitting in the actual vehicle.

So to try to wrap things up--hopefully I haven't talked your ears off--GM is very interested in BioPreferred status. We've tried to put some thought into it and see how to handle it. We need technically, economically feasible materials, and a way for our suppliers to verify this renewable content, and they utilize the LCA information that's out there.

We don't want--we honestly don't want bio just for bio. We want bio because it's better for the environment on these specific applications. In some applications, it's not, and some applications recycled materials better.

You know, there's recycled materials, adds a lot of mass, you know, depending on your application, your polymer, and that can be just as bad as the virgin materials.

So we need to be able to compare those things. It's the blind leading the blind if we can't compare them. We have to see the big picture, because what we're dealing with is the big picture. The consumers, they don't want to be misled, and a lot of them know when they are. That's a very bad thing. You don't want to mislead your consumers. If you do, you don't have your business for very long.

So we recommend certification to a public metric system, like the guys before us talked about, with the assembly of your vehicle level and the whole product level, not necessarily a material level. Rate the percentage of parts and components with a minimum--or greater than or equal to your minimum bio content, and then go into the details.

So, you know, say we have 15 parts, this other model has 15 parts, then go from there. And, you know, the rest that have

six or seven, they aren't as preferred, if you will, as the ones that have more, and that's just basic, you know, data comparison.

And then we recommend, obviously, a cautious approach to labeling, maybe somehow--you know, there's ISO standards for marking of plastic parts, so if--you know--and we are a global company. We ship parts globally. So we have to be careful there.

But, you know, maybe for new parts, you mold in, not a code, but maybe your little, a little icon that said how much--you know, a leaf or something, that said this is a BioPreferred status, just by having that little leaf molded in, into your tool, which can be done.

So those are our thoughts. Hopefully, it's a little bit clearer than mud, and I really appreciate your time, and the privilege to speak with everyone, and get our opinion heard. It's a very, very big honor for us. So I do appreciate that.

MR. BUCKHALT: Lora, thank you very much for your comments. It's obviously a complex situation; right? No pun intended on that one.

MS. HERRON: Yes.

MR. BUCKHALT: An automobile is a complex vehicle and many, many, many parts.

We had some questions that came in. Jessica, do you want to read the question that came in via the Web.

MS. RIEDL: Yes. We have one question for--I'm sorry--it's from Dorothy Allen. It is: Can biobased and non-degradable materials disposed in a landfill be regarded as sequestered carbon?

MS. HERRON: Well, it's a very, very good question, that I am not sure of the answer for. Unfortunately. I apologize. I didn't think they could be, but I'm not--I am not positive on that.

MR. BUCKHALT: Why don't we let your former professor answer that question.

MS. HERRON: I think that's a good idea.

DR. NARAYAN: Yes, both are sequestered, but remember what I said, that if you are going to take that kind of approach, which says I'm--by putting it in a landfill I've sequestered the carbon, basically, you are then--if you put a biomaterial, then it has a negative C02 implication, because in making that you have fixed C02. So these are two separate things. If the baseline is that this carbon is ultimately going to go into the atmosphere, then the bio will be at zero, and the C02 from the petro feedstock will be a plus something.

If you took it, like saying, well, I'm never going to get this released, then you're at zero, then the value proposition for the bio would be that in making this bio product, you'll have sequestered C02 which didn't come from the petro. So that's how you have to visualize that.

MR. BUCKHALT: Another question, Jessica?

MS. RIEDL: Yes. Has GM looked into covering the extra costs associated with the use of biobased materials by selling carbon credits in the existing carbon markets?

MS. HERRON: GM has just vaguely looked into the carbon credits right now. That is an option. Right now, there are no current--I should make sure I clarify--no current North American OEMs doing that. I don't know about the other OEMs. It's definitely an option, and that we're trying to get into. It all depends on where the regulations come from, and if we're allowed to do the carbon trading.

Right now, GM, the automotive industry mostly has stayed out of that business, if you will. We're trying to do additional things, such as our landfill- free plants, and we're going to, we're trying to get to, I believe, 50-percent landfill-free, I

believe by the end of this year or next year. So that's phenomenal, and that, obviously, would help along with the carbon credits there.

Right now, the bio, a lot of the biobased materials are--and we have some, like I mentioned before, but they're so--the ones that actually we can meet in order to get them on the capacity and the volume that we need, they're kind of out of our price range.

We need to--we owe the taxpayers a lot of money, we need to repay those loans, and we can't pass through a cost like this to the consumer. So we are keeping our options open in other ways that we can work around the high cost of some of the bio issues. And in the future, the carbon trading costs may be one of them. That's a very, very good possibility.

MR. BUCKHALT: We've gotten way behind, so I'm going to thank you, Lora, for your time and attention that you've given us

today, and a lot of things to think about, and we look forward to working with the whole of the automobile industry, and GM of course is an American manufacturer, and there are a couple others, which I won't mention, who are also doing some green things. They're mentioning your name, so you're curious. Jeff has a point--

MS. HERRON: That's all right. It's wonderful. Thank you so much.

MR. BUCKHALT: Jeff, one more point.

MR. GOODMAN: Just one quick comment, Ron. With respect to concerns of manufacturers about some of the complications of labeling, and that is our labeling program is voluntary. USDA will not make any requirements for manufacturers of biobased products to require them to get a label. So for any manufacturer that thinks it's more complicated or more trouble than it's worth, they just need not participate.

MS. HERRON: Thank you.

MR. BUCKHALT: We'll take a 10 minute break, folks. Those of you who are on the line, just leave your computers on idle, as they say, and come back and join us again, if you will, in about ten minutes, and we'll get back at it.

After the break, we'll be talking to a lot of other manufacturers and getting their suggestions on how we handle this. We'll hear from the bedding industry, from the furniture industry, and we're going to have a little bit of a life cycle analysis at the end from Jim Pollack. So ten minutes.

[Break.]

MR. BUCKHALT: Okay, folks, we're back from break. Moving on to our next speaker, let me introduce Clinton Boyd, very quickly. He's Dr. Clinton Boyd, senior scientist at Sustainable Research Group, a consulting firm that provides sustainability research, marketing and project design, and

management services at advanced organizations, integration of sustainable development principles into its business model. He has a PhD in biochemistry--we've been hearing a lot of that biochemistry, haven't we, today--from Rhodes University, South Africa. Dr. Boyd has worked in academia as a research biochemist, studying the pharmacological and toxicological effects of chemicals and other environmental factors in neurodegenerative diseases and cancer. Say that with one breath.

Dr. Boyd serves in an advisory capacity for a number of initiatives addressing biobased products, green chemistry and chemicals policy.

Dr. Boyd.

DR. BOYD: Good morning, everybody. So I'm here today, I actually work for a company called Sustainable Research Group, we are a consulting firm, but I'm here today to represent the Business and Institutional Furniture Manufacturer's

Association, BIFMA's perspective on biobased content of complex assemblies, in this case the complex assembly being office furniture.

For those who are not familiar, the Business and Institutional Furniture Manufacturer's Association, or BIFMA, is a member-based nonprofit organization that serves the office and furniture industry, here, in North America.

Now due to the growing demand and interest in green or sustainable office products, BIFMA, a couple of years ago, embarked on an effort to develop a sustainable product standard for its industry.

To that end, it partnered with NSF International, which is an ANSI, American National Standards Institute, accredited standards developer, to develop an open, consensus-based standard for the industry.

By being open and consensus-based, they invited a number of stakeholders that were interested in the development of the

standard, which included, you know, obviously, original office equipment manufacturers within the furniture industry, their suppliers, their customers, the Federal Government, various EPA agencies, State of California, testing laboratories and INGEO groups, environmental, health community, etcetera.

So a very widespread interest in developing the standard. Now they spent several developing this, and it's worth looking at the standard to get a perspective of how BIFMA addresses biobased, because the standard really represents a culmination of this industry's thinking on green and sustainability, and how it applies to its standard, applies to its industry.

Well, I guess what's also important, from a procurement perspective, is to recognize that some of the stakeholders that were involved in the development of this standard included the EPA's Environmentally Preferable Purchasing Program, and

representatives from the State of California.

Okay. So what I'll do first is just take you through the standard, cause it'll kind of give you a sense of--by doing this, the industry created a--basically put "a stake in the sand," and said this is where we currently stand in terms of green and sustainability for one industry, and then how do we move the industry as a whole forward? The concept of continuous improvement to improve the sustainability of greenness of its products.

And from the beginning, the standard was meant to be a voluntary standard, it was meant to be more rewards-based rather than punitive, to actually encourage companies to take these steps, baby steps, and earn credits or points for getting there.

It is a continuous improvement model and understands that as new issues develop, they need to be addressed, the standard will be redefined.

So this first slide here is just to quickly give you a sense of what the standard is about. The purpose statement is to provide measurable market-based definitions of aggressively more sustainable furniture by establishing performance criteria that address environmental and social aspects throughout the supply chain.

So very much has a whole life cycle perspective, life cycle thinking for the industry.

In terms of its scope--this is very important when we start looking at things in terms of the biobased and procurement--is that the standard applies to all business and institutional furniture, including but not limited to movable walls, furniture, tables, seating and accessories.

There's a lot of different product categories which fall under this general generic umbrella of office furniture. It may sound like a very homogenous industry but

there are a lot of different product categories that will show up underneath that.

The scope of the standard also applies to materials and components manufactured by suppliers to the furniture manufacturers, and it can be applied to one or multiple facilities.

The key thing of this standard is it is produce-based, and it does address the characteristics of those products in the general areas of materials, use of energy, human ecosystem health, and social responsibility. It's again just hitting the stage, that the biobased idea of material property is one small piece of this larger systems thinking.

And this is kind of where the combination of the thinking came to. That it was better to address the sustainability of greenness of this industry from a systems perspective rather than a single attribute, cause this recognized the fact that there are

multiple factors which contribute to the environmental footprint that a product will have, and that there are environmental tradeoffs between these various pieces, these various factors.

So the way the standard is structured or organized, is, firstly, there are prerequisites, there are certain things you have to do to even play in the game, and then they are points-based credits.

And these are organized into broad categories of materials, energy, atmosphere, human ecosystem, health, social responsibility.

And there are points that are available at the product level, the process level, facility level, and the corporate level.

And basically the way the rewards system works is that entry level is you have to obtain 32 points to be able to certify to the standard, and a key thing here is that--

and that progressively more points are needed as you go from silver to gold to platinum.

But not only does the number of points increase that you need to get, but the number of product level points increased. So really there's five that have to be product-related, for silver, eleven, for gold, eighteen, for platinum.

The reason why I'm stressing this is that, again, by a systems perspective, you have to do the prerequisites. You need a minimum of 32 points but you can "pick and choose" which of those points you want to earn in order to get those 32 points, as long as five of them are product-based.

Then there's also an option to have first, second or third party certification towards the standard, where first party is yourself declare that you met the standard, and then second party and third party of increasing levels of stringency, for independent verification towards the standard.

And then BIFMA themselves have trademarked a third party certification for the standard known as Level. Now I bring this up because it's relevant to the whole labeling question.

So now the first thing I want to convey, then, is that the standard addresses a lot more than just biobased. And that's important to remember. But how does it address biobased, specifically?

Well, there are four levels. There are definitions. There are credits that specifically address renewable materials. There's a prerequisite for a design for the environment program, which I'll explain in a moment, and there's credits that could be impacted--they're not specifically addressed biobased, but they could be impacted by making material selections.

So the first thing to look at is the definition, and again, I'm trying to contrast some of the issues that we're going

to have to address with the designation program in the BioPreferred, is differences in scoping and differences in definitions. It has some bearing, which I haven't heard anyone else address yet.

This is how biobased is defined within the standard. A renewable material. Material that is replenishable and replenished in some reasonable time scale.

Renewable materials, material sources included, but are not limited to wood, grass fibers, biobased plastics, and biobased fuels.

It's interesting--the standard actually never uses the term biobased, except once, somewhere in the whole standard is actually used, the word biobased. But it uses the word renewable.

Well, it's very important there, is that that definition is very different to the USDA's definition of biobased. There's no limitation on geography. There's no

limitation on sourcing, international or domestic, and there's no limitation on mature markets. So therefore, how biobased has been used in the office furniture industry can be very different to how biobased has been used by the BioPreferred program. And that's important to remember.

Okay. So let's quickly have a look at some of the specific credits that--there is a credit with one point where you are, rewarded. The standard does not recognize that there is some value to biobased materials. And you only get one point out of those thirty-two for actually having a biobased in it, and that's this credit 5.5, which is rapidly renewable materials.

The intent is to increase the use of rapidly renewable materials and obtained from biobased sources--that's the one time that word biobased is used--and decrease dependency on petroleum-based thresholds.

Rapidly renewable materials are

those which can reach commercial maturity in ten years or less. Okay. Now there's a whole bunch of other things there, but the key thing to note is at the bottom. Again, to contrast to this, to put it in perspective, the BioPreferred program, the first thing to remember is that this is related to the biobased content only of the final product which you're manufacturing. You're not rewarded for including biobased content into your packaging, or process chemicals, or maintenance operations chemicals.

Future standards, iterations of the standard may address that. But right now, the only place where biobased addressed is at the level of the product itself.

Also note that no restriction is placed on the geographic sourcing or nature of the biobased feedstock, where it comes from. All right. And a methodology for determining the biobased content is not specified. So there's no specific reference to ASTMD6866

here, in a requirement that you have to test-- you just have to provide adequate documentation to the auditor, that in order to earn this point, that it actually is biobased content.

And one thing you'll notice is the threshold was one percent by weight or volume, and this was calculated and based on the total weight of the product. And that threshold is very low at one percent, but it actually recognizes that this was an entry-level, that biobased is not, biobased materials are not routinely used in office furniture industry, outside of wood and particle board, which normally don't necessarily meet the definitions of biobased program. All right.

So we can think, boy, there's a lot of particle board, there's a lot of wood that's being used in the furniture industry, and that it's not necessarily covered by the BioPreferred program because of the close of mature markets since 1972.

So you have to bear that in mind. But it is based, at least for this credit, is based on a total--total product. At the same time, it did recognize we have--when we have rewarded you, specifically, you know, for addressing rapidly renewable materials, at a very low entry level, one percent, recognizing that there are options coming. Fabrics and bioplastics, and things are happening. All right.

So there is--so it really is an entry-level perspective. There is another credit which specifically addressed biobased, and that is the biobased renewable materials or sustainable wood. This is really about the use of wood or particle board, or other composite wood in the products.

But, really, this is not a credit to reward you for the use of the wood, or the biobased material. It's for the specifying from sustainably-managed sources. So is this really about whether or not the wood, the

combination of materials, composite woods that are in your product, are sourced from sustainably-forested and harvested practices?

Okay. So that's really the only two places, specifically, that the standard addresses biobased.

But that being said, on one hand, there's this recognition, you are actually getting a reward for having rapidly renewable materials, cause that kind a recognizes the value. And I earlier stated, well, what about the environmental tradeoffs?

We don't want--the standards want to reward, per se, the biobased, but it does--see, the compromise position was you get this one point. But all the other implications we've talked about today--is that really better? is that really green? is that really sustainable? is actually addressed by the fact that your selection of this material, if you choose to include this in your product, it could have positive or negative indications

for your ability to earn other credits.

So that's really how the whole life cycle side of biobased was addressed in the standard.

So here's just some examples in a prerequisite. A prerequisite is something you have to do before you can certify your product. It lists, at a minimum, what your DFE program has to look at. DFE means you have to take into account all these considerations before you even design the product, before it evens goes into manufacturing.

And right up there, newer materials is one of them. So you are required to show that you've assessed, looked into the possibility of using renewable materials, and what impact that will have on your product's ability to meet the standard, before you even build the product, manufacture the product.

There is another credit that's valuable for life cycle assessment, not

specifically for biobased materials versus petroleum, but you could earn a point where you've shown whether or not that biobased material made any difference to your decision. Okay.

There's another credit which is recyclable and biodegradable materials, and this is really about just--addresses that whole end-of-life concern. If you do have, if you do choose to put biobased or renewable products, materials, you have to somehow label them. You somehow have to be able to--before you can claim that they are biodegradable or compostable, you have to be able to demonstrate that there are recycling "biodegration" facilities in at least six out of ten use EPA regions.

So that addresses that concern early on, what--you call something biodegradable and compostable, and there really isn't any recycling infrastructure.

So now if you go and specify

something in your product to earn that one percent, you can still get that point, but it may not enable you to get this point, because even though it is compostable and biodegradable, theoretically, there actually is no infrastructure, and therefore you would not be able to earn this point.

So again, a very innovative way in which all these issues have been addressed.

And then this is a whole long list, just to show you, a whole bunch of other credits that impact, that your decision could have. Climate neutral materials. It may help you earn that one, because of the argument we heard from Dr. Narayan about the C02 material footprint.

Efficient use of materials. Recycled content. That's a tradeoff we heard earlier. You specify renewable but by putting more renewable in your product, you now have less recycled, option for recycled content. So you may lose this credit. Right. But

unless you choose something like a biopolymer that is both compostable and recyclable and you could earn both.

So again, not punishing, not rewarding, just all the consequences that play out. There is a whole bunch there. Otherwise, how it affects your end-of-life issues, how it affects your solid waste, how it affects body and energy, how it affects human ecosystem health from a perspective of what are all the chemicals that come with that biobased material?

So you may choose something biobased that helps meet all the other credits, but it's got some nasty chemicals in there which then have a negative impact on earning this credit. And finally, low-emitting furniture. That's a big issue for the office furniture industry, cause when we talk about procurement, in the CPG, in the early days of office furniture, it was recycled content and indoor air quality

issues.

So if you go and specify something as biobased into your product, it may have a negative effect, or may have a positive effect on your ability to get furniture to earn that low-emitting furniture credit.

All right. So that kind a just gives you a sense of how the office furniture industry has addressed this. So to wrap it up, then, in terms of some considerations, then, for the biobased program.

It's firstly recognized that office furniture covers a wide range of product categories. It may sound like a homogenous product but it's not. There's a lot of different things that fall under product categories.

And within each of those product categories, the nature and proportion of materials ranges, both within that product category and between product categories. To give you an example, we had a product that's

almost a 100 percent particle board, which may not count because it's particle board and fails the mature market, maturity clause. Or we have another product which is a 100 percent steel, where there is no option for biobased content.

So even within, there's a wide variety of product categories, and then even within product categories there's a wide range of various portions of various materials.

And again this is just important, because how you calculate that biobased quantity, it's going to be difficult.

There are limited commercial opportunities in specified biobased materials. There are some fabrics out there, we've heard a lot about foam, composite panels, and, you know, so that's why we aren't seeing a wholesale incorporation of these materials into the office furniture industry right now, just the options that really exist.

The same kind of issues that GM

brought up, in terms of availability, the infrastructure, things like that. And the option to use those materials varies from product to product. So even if you had a new acoustical panel that was made from PLA, that may be useful for a product category that uses acoustical panels, but it doesn't help a filing cabinet. It doesn't help a bookshelf, just because that option exists. Okay.

So one of the approaches that we would recommend, then, is that complex assemblies are a hierarchy of chemicals going into materials, materials going into components, components going into subassemblies, and subassemblies go into a product.

You already have a system in place where you're designating individual components. So we would recommend that specifically materials and components should first be individually designated on the existing biobased program, meeting all the

required prerequisites, whether it be the minimum--using the approach that you had, calculating the minimum biobased content, using ASTMD6866, doing BEES analysis, however you want to change that.

Well, once those individual components have been, have met their requirements, and are using the label for complex assemblies, then could, is just one model, is in order to be designated, a complex assembly must incorporate one or more of these designated material components, each of which meets its own biobased content.

So for me to call my product BioPreferred, I have to specify a foam that has already been designated, not someone else's foam that may also be biobased. But, by the way, I can--this kind of goes to the formaldehyde rule which is already applied to the furniture industry. It's a very similar model.

But at the same time, this

recognizes that--so therefore the calculations of minimum biobased content and how you test it, and how you do the life cycle assessment, you base at the level of the individual components. At the same time, recognizing that I could have a chair, or have some product grease on the slider, and I go and find a product grease that's BioPreferred, and I use that, does that now mean that my chair could meet BioPreferred status?

There just no definition--there should be some minimum level, that the chair, as a whole be--it's a basic--I'm modeling as a hybrid model. You apply it at both levels. You do the calculations of the biobased content on individual components, but then the final complex assembly, as a sum, must have a minimum that it must meet.

Again, that's kind of stated there again. And then just, you know, from BIFMA's perspective, it's been on this journey about procurement programs for a long time, and as

you saw with the CPG, the office furniture was one of the initial ones. And one of the reasons why we went down this whole standard is development, is that BIFMA promotes and encourages whole systems, and continuous improvement model, where biobased content is considered in the larger context and sustainability of complex assembly products where there is a single attribute.

But when it comes to this idea of labeling, then, is that BIFMA would welcome stakeholder participation to further develop and refine the biobased-related credits.

How can we change, modify the credits that are already in the standard, so they're kind of aligned, address the issues of the BioPreferred program?

And into this, the possibility that what BIFMA would value is where the label--you talk about the labeling program was voluntary. BIFMA's really promoting this Level label, where it communicates to the

marketplace that this product has met a certain level of performance for green or sustainability.

So whatever's at that level encompassed what you wanted to see for the USDA voluntary label in terms of that office furniture as a complex assembly. Thank you very much.

MR. BUCKHALT: Do we have any questions here in the audience? Anybody have a question? Goodness. So you've already established your own way of looking at biobased, is the long and the short of it, which may be different than anything anybody else is doing.

That's okay. We'll all get down the road.

DR. BOYD: I think there is value, because we've addressed it simply at this one percent total, but the idea of having a model where there--if you took a hybrid model of having products or materials, or the

components that worry--that how that design for the environment team, when they're choosing foams, or choosing materials to go into the final product to meet that one percent, whatever target is, there was already a system out there that helped them say this foam is better than that foam cause it's already had BioPreferred status because it's had an LCA done, it's met the minimum biobased content.

So we see a good opportunity for synergism here.

MR. BUCKHALT: Okay. We have a couple questions, so just stay up here for a moment. Jessica.

MS. RIEDL: Questions from online participants. Katrina Cornish asks: Regarding the sustainable wood, can wood products made from woody biomass, such as particle board, be covered? The woody material is a byproduct from a sustainably- grown shrub, guayule?

MR. BUCKHALT: Guayule.

MS. RIEDL: I don't know how to pronounce that. I'm sorry. --grown for domestic rubber production?

MR. BUCKHALT: Was that Katrina Cornish? Is that who asked that?

MS. RIEDL: Yes.

MR. BUCKHALT: Okay.

DR. BOYD: I think that's in relationship to the rapidly renewable credit. If you can demonstrate that the particle board that you make comes from a species that grows, and a turnover, one to ten years, then yes.

MR. BUCKHALT: Yes. Katrina Cornish. I just happen to know this individual. I used to work for the Ag Research Service, and she's the individual who actually developed this shrub and is now head of a company and makes--guayule is a natural rubber, is what it is. And I would say that natural rubber, it's a new crop, a new plant, and I think it certainly comes under the 1972

arbitrary date that was set some time ago for mature markets.

DR. BOYD: Like I said, I specifically mentioned that credit does not specify the nature of the biomaterials. As long as it meets that one to ten--the furniture industry is only going to use them for the same things that GM mentioned-cost, performance, quantity. So if you--it doesn't matter where your product comes from, what the biomaterial is, as long as it's rapidly renewable by the definition of one to ten years, it will be considered, and it could earn this credit, should an OEM decide to use it for all the other reasons.

MR. BUCKHALT: Go ahead, Jessica.

MS. RIEDL: A question from Mike Rebell, online participant. Are there reductions in credits if the furniture contains formaldehyde or PBC versus a bio product that does not?

DR. BOYD: The standard was very

careful not to--it does not mandate, ban, or take any--or prohibit any particular material type. Instead, it's the performance attribute, the environmental performance attribute that we're after.

If you use PBC, there's a possibility that it could impact your indoor air quality issue, because of the thalates that are in, that might come with the PBC.

So the standard itself does not ban or prohibit the use of PBC, but that again just is a material choice that could again impact your ability to earn a bunch of other credits.

Did that address that question?

MS. RIEDL: I'm not sure. We might find out later. He has another question and it is: What is BIFMA's position on wheatboard?

DR. BOYD: Again, BIFMA does not have a position. Individual companies have tried using that wheatboard. From the

perspective of the standard, wheatboard would meet the basis of rapidly renewable. Wheatboard I believe was being used, but this is an example of where the supply disappeared. The manufacturer stopped making the wheatboard and therefore was no longer an option to be specified.

MR. BUCKHALT: From the BioPreferred standpoint, wheatboard is a fairly new product. It's not been on the market that long. It is not a mature market for designation purposes, for a mandatory federal procurement, not necessarily for the label, that's another story, but for the BioPreferred designation process, that wheatboard is out there. There's a couple of companies that make that product, so--anything else, Jess? Okay. Anybody here have questions?

[No response]

MR. BUCKHALT: All right. Let's give a round of applause. Thank you for your

time. Appreciate it, sir.

[Applause]

MR. BUCKHALT: All right. Good. Thank you. Thanks very much. I'm going to bring up our next two speakers who are going to do a tag team. Ryan Trainer is executive vice president and general counsel for the International Sleep Products Association, ISPA. You put that on a moment ago, right? so you know what you're doing there. Good.

This trade association is dedicated to protecting and enhancing the growth probability, and the stature of the mattress manufacturing industry. Mr. Trainer's duties include managing ISPA's government relations and advocacy efforts, general legal matters, industry statistics, and industry sustainability initiative.

He is an attorney. We won't hold that against him, though. He's a graduate of the University of Colorado, Bachelor of Arts and economics, 1978, received his law degree

from George Washington University, J.D., 1981.

So Ryan will be sharing the podium and I don't know how you guys what to tag team this, with Richard Diamonstein. Richard Diamonstein is executive vice president of paramount Industries, a mattress manufacturer in Norfolk, Virginia. The company produces the Comfort Solutions family brands, is part of a worldwide network of licensees. In addition, Paramount manufactures various private label brands, and product lines purchased by numerous federal agencies. It's a third generation family business, started in 1930. Richard served on the board of trustees, International Sleep Products Association, '94-2005, and served in numerous capacities in the organization, as its chair, 2003-2004.

We've met with Richard, I'll just do disclosure, and also with Ryan. They visited us in Washington. SO I'll just give you that disclosure. They came to us and said

we have products, we want to make them very, very green, we want to see what we need to do to make them a BioPreferred product.

So guys, if one goes first, and-- okay. So go ahead. Go ahead, Ryan.

MR. TRAINER: Okay. Very good. I'd like to say, I really appreciate the opportunity to be here this morning to talk to you about our industry and our products. Richard and I will provide a profile of the products that we manufacture as well as our industry, and in doing so, we'll highlight some of the issues that need to be considered as you venture into the complex products area, at least as it relates to the mattress industry.

I'll be providing sort of the big broad picture for the industry, and Richard then will be providing some specific examples of how some of these issues affect his company, in particular, but also the manufacturer and what happens on the

manufacturing floor, in general.

All right. First of all, in terms of an overview of the products that we use, we all sleep on a mattress every night but you probably don't have a real good "feel" for exactly what's underneath the cover there.

Foam is a major component for us. We use both polyurethane foam, flexible polyurethane foam, as well as latex. In the interior, as well as the exterior, we will have various types of fibers. Many of them are synthetic. Some of them are natural. Some of them are rayons that are made from wood pulp. We also, in a very small percentage but a growing percentage of our products, we will have air bladders that will provide the cushioning.

In many mattresses, you'll have a steel construction, a steel coil construction that will provide firmness and support. As well, we use steel wires in the foundations of our mattresses, the box springs of our

mattresses. And then we also have wood in the foundations of our products.

In terms of industry structure, most mattresses are made either locally or regionally. Transportation costs have historically placed a limitation on the footprint of many factories. That is changing, to some extent, as transport costs fall, in relative terms. But generally, we still are a local or regional industry.

We're relatively non-concentrated as compared to many other manufactured products. The top six manufacturers probably account for around 60 percent of our market, five brands, for 60 percent of our market, and the rest of them are comprised of smaller chains, or licensing brands, or individual family-owned or corporately-owned companies.

Approximately 90 percent of the mattresses that are sold in the United States today are manufactured here.

Very few of our manufacturers are

vertically integrated, which will pose a problem for us as we are going through the documentation and testing phase of any program that's implemented here.

As a result, a company, such as Richard's, would not have direct control over how his components are made, or what the percentages of biobased material are in that. He would need to rely on representations provided by the vendor, or go through the trouble of conducting his own tests. So that's going to be a challenge for us.

There are a few companies that will make their own springs, some will pour their own foam, but most of those are few and far--are an exception.

We're also peculiar, in that we don't have--we're not integrated at retail. Most mattress manufacturers will sell to a third-party retailer. We do have some companies that will market directly via the Internet or through factory-owned stores; but

again, those are the exception.

In terms of the size of our plants, we're a relatively modest industry. As you can see, over half of the individual plants in the United States have, mattress plants in the United States have fewer than 100 employees. In terms of the basic styles of mattresses that we have, we have the innerspring mattress. Some mattresses are made 100 percent with foam, either polyurethane, or a mix of polyurethane and latex foam.

As I mentioned, we also have an emerging technology in terms of air mattresses. They've been around for 20 years or so, in terms of the sophisticated air mattresses, not your camping air mattress, but the kind of air mattress that will have a motor attached to it, and that you can control the firmness. Their market share is growing.

Water beds are still around. They're kind of a dinosaur, though. They're a

very small percentage of the market. And then we have hybrids that are a mix of any of these types of mattress technologies.

In terms of the box springs, again, the primary technology is just a stationary product that is usually a wood frame with a steel superstructure on it, and then it's covered with some sort of resilient material, and usually a fabric.

Some stationary systems are all wood platforms, and we have also a new innovation here with the adjustable foundation. It's taking a lot of the technology that you would have used in a hospital bed and putting it into the residential context.

And there you have a motor attached to it, and it's a more mechanical piece of equipment.

Our technical manufacturing processes, at the assembly level, are fairly simple. We use a variety of mechanical and

manual methods to put together our products. These include sewing, gluing, nailing, and then different types of fastening systems. Most of the components that we use are made in the United States. Some of them are imported, but most of them are made locally here.

In terms of getting a "feel" for the size of our industry, at wholesale, the value of our products are approximately $6 billion per year. At retail, that would be roughly twice that. So to the retail consumer, we sell approximately $12 billion worth of merchandise annually.

To help put that into physical terms, the chart on the left gives you a feel for the quantities of materials that we consume in manufacturing new products. Roughly 350,000 short tons of steel, so many board-feet of wood, and so forth.

To put it into a graphic, if you were to stack each mattress and foundation on top of each other, daily, we sell a 20-mile

tall mountain of mattresses each day.

Some of the greening efforts that we've undertaken, in the past, to respond to environmental issues that confront us. We're consistently committed to trying to improve the sustainability of our products and our industry.

We're using more plant-based materials in our polyurethane and latex foams. We're using more natural and synthetic fibers in our covering, and in our support materials, as well as some more animal fibers. Wool is having a come-back in some of our products. Wood for foundation we've used for decades, and that's an issue that we need to talk about, because it certainly is a well-established product, but it is an important part of our products.

Virtually all the steel we use in our mattresses are recycled, and most of the polyester fiber and fabrics are made from recycled polyesters.

We're also very sensitive to some of the health and safety issues that come up from time to time. Richard was reminding me, this morning, that one of the big issues 20 years ago was the phasing out of the CFCs from the foam that we produce. We now produce it with a variety of other means. We'll talk about that a little bit more, in a few moments.

Some of our other sustainability efforts, we're continually trying to minimize the amount of scrap that we have at the industrial level. As I said, most mattresses are made locally, or regionally, and we try to minimize some of the packing materials, as well, that we use in our products.

Richard.

MR. DIAMONSTEIN: And from a manufacturer's level, just some of the practical application that we have here. For recycling, we've been doing a lot of these things for years. I've been in the industry,

now, 22 years. We have recycled a lot of our components over that period of time. Steel is an example. If the steel is defective, or in the past, when we used to tear down product, that steel went back to the steel manufacturer where, it was reused, recycled.

As Ryan mentioned, about 80 percent of the steel that goes into a mattress, right now, is recycled component. Some of the obstacles, though, in that area, we have a lot of pre-consumer industrial waste that we generate.

So as an example, when we quilt a panel or the cover for the mattress, you're not going to use--it's a fabric that's quilted to foam, and the fall-off from that we bale up, we have these tremendous bales, and in the past, we were able to get paid for that recycled material.

Now we've got arrangements with a couple of the different trash companies, where they will haul it away, it does get recycled,

but there is no value in that waste at this point.

But as an industry, or as a company, we have very little--our waste disposal bills are minimal because we recycle the foam fall-off, we recycle the cardboard. Even the wood frame, the innerspring units, the steel that comes in is compressed into a crate with a heavy-duty wood frame. Those wood frames go back to the manufacturer where they reuse those on other crates coming in.

So the amount that we dispose of, out of our factory, is minimal. Okay.

MR. TRAINER: Just before we came up, I believe an article was passed around, and I believe it'll be available, electronically, on the BioPreferred Web site after the seminar is over.

But that article describes some of the efforts that our industry has undertaken, and as well as the component suppliers to our industry have undertaken, to increase the bio

content of the foams that we're using.

Right now, there's a lot of research going into that, there's a strong interest in boosting that, but it does have some limitations in terms of quality.

We also, as I mentioned, are using more natural fibers. Rayon has had a big come-back in our product. Wool is coming back, cotton is coming back, and then we also have the wood in our foundations.

In terms of legacy materials, we need to talk through some of that. Wood has been around for decades. I don't know when we first started using that, but I wouldn't be surprised if it's been an important component for us for 100 years.

Cotton fiber was a major component in mattress manufacturing up until the mid 1970's. It was phased out, largely because of some new fire standards that we had to implement, and cotton does not perform well when it's exposed to a smoldering heat source.

It's since made a come-back, though, partly because the fire standards have changed and we need to address a larger fire risk, using other methods which allows cotton to be used, and also because of environmental and market trend changes, the cotton's coming back.

So I'm not sure how that would be treated as a mature product, or not, because it was there in the mid '70s, left, and now it's making a resurgence. So that's going to be an issue that will need to be discussed here.

In terms of our opportunities, fiber materials and fabrics, I think that there's a lot of opportunities there. Consumer demand is strong for improving the biobased nature, or the environmental performance of at least the outer fabric.

Wood is not going to change. The source of our wood is primarily Canada. The wood comes from sustainable forests. So I

don't see any large room for changes there.

Latex foam is taking an increasing part of the market share. It's still a relatively small part of the market; but it's increasing. And then as I said, polyurethane foam is made from materials--biomaterials are increasing.

Richard.

MR. DIAMONSTEIN: And once again, as a practical application, we've developed numerous products that are used in the--for a lot of our federal customers, and one of the things--the resistance, and the presentation by GM, I'm going to mirror a lot of the comments that were made there.

We're perfectly capable of making products that have more biobased content, but the issue is always going to be, What is it that the consumer is willing to pay, whether the consumer is a retail customer in a retail furniture store, or the Federal Government customer? Because there is a cost associated

with that. That cost is going to absolutely be related to the percentage of biobased content that goes into the components that we use.

But the technology is definitely there. If the biobased content is kept at an affordable level, there are a lot of opportunities to expand the use of biobased contents in our mattress products, especially with the Federal Government.

MR. TRAINER: Performance is also an issue, and Richard can talk about that, for example, in the foam arena. As we add more biobased materials to the foam, we do see some degradation in the durability and the performance of the product. So the technology again is changing, but we do have some limitations, at present, on what we can do there.

MR. DIAMONSTEIN: And as far as the performance issue, as a manufacturer, you don't have but so many opportunities to put a

product out there that is not going to perform. So if you put a product out in the field, it doesn't perform, that's part of your reputation, and it's very difficult to repair that reputation.

So the way that we look at it, in developing products that have biobased content--as an example, the soy polyols in our foams--we will use the maximum soy content in the foam, without risking a degradation in the overall quality of the product. And that's also important.

And our industry, and a lot of the foam manufacturers, are working hard to develop newer technology and increasing the amount and the percentages of soy-based polyols, which I think Ryan's going to elaborate on a little bit too.

MR. TRAINER: Consumer education is also a big issue that we need to deal with. We do have some green washing in our industry. We do have very soft terms that

people are using for a variety of purposes. We're looking at that. We're trying to develop an industry vocabulary that we will use in a consistent manner. Unlike BIFMA, we have not gone the route yet of a sustainable product standard. That's something that we're looking at, but it's not something that I think that we'll be doing immediately.

But educating the consumer, and educating the manufacturer and the retailer on how to communicate well with the consumer, is going to be key here.

MR. DIAMONSTEIN: Let me make one comment. I'm just going to make one other comment on the educational piece. As I visit and work to educate some of the Federal Government customers, and as I mentioned yesterday, going in armed with knowledge of what makes a product green, is the product-- you know, and Ryan mentioned green washing. You know, I've got competition that will go out there and say, well, their product is

green because it has recycled steel. The innerspring has recycled steel.

Well, everybody in our industry buys steel components, innerspring components that have recycled steel. So that education process, and setting the baseline is very important, and just making sure that the buyers are properly educated in order to make decisions, and decisions where they may end up spending more than on a standard mattress.

MR. TRAINER: I'll spend a few moments just talking also about what our industry is doing in terms of the end of the useful life of our products. We are getting a lot of pressure from consumers as well as from landfill operators, and state and local governments. We're working hard to try to develop an infrastructure for recycling mattresses and mattress components; but it's a big challenge.

Many of the materials in our products do have some recycle value. The

steel springs and the foam are fairly readily recycled. The fibers and wood are more of a challenge. We're trying to nurture these recycling operations but it's a very costly enterprise, and the question of who will pay for that is not resolved yet.

If we recycle at least 25 percent of what's discarded, this gives us an idea of what the potential material, quantities that can be reclaimed are. Our next steps are to work with retailers to try to improve the collection and efficiency of our recycling operations, look for opportunities for creating strategic partnerships, looking for new markets for our recycled products, and helping develop improved funding mechanisms.

In terms of communicating the BioPreferred program to our industry, I just want to give you a brief outline of how we are structured as a trade association, as well as our relevant committees where some of these issues would be raised, and relevant parties

want to come in and participate. We also have a couple of industry events, where it would be useful, I think, to continue this dialogue as we go forward here.

I want to thank you very much for the opportunity to talk here this morning. In terms of what type of model we would support, we certainly like the simplicity of the percentage-based weight approach, but I think there are some tradeoffs there, that need to be thought through very carefully.

For example, unlike perhaps an auto, where you won't use a biobased product as a window, at least as far as I know, you don't have a biobased substitute for glass, and the biobased substitutes for some steels would be very limited, and engine parts.

In a mattress, the steel innersprings can be substituted for foam, or for fiber. And so you can have a tradeoff between a steel product and a biobased product, or biobased material.

And given the high percentage of steel recycling that goes on in producing our steel coils, I wonder if that's going to create a false tradeoff, if the biobased material is given too much emphasis.

Is there an ability to take into account the tradeoffs that would occur from the carbon fixation that occurs when the steel--or the carbon savings that occur when the steel is recycled.

Likewise, we have some materials that are produced, using captured CO2, C02 that's captured from another industrial application. Will those savings, environmental savings, be lost in a biobased analysis, if we go with something that's too simple in terms of a weight-based approach?

I like the approach that BIFMA has suggested, where you might have a component-based approach, where, if you choose one of several categories of components, or multiple, two or more of a certain category or

something, that meets a given limit, that that would qualify the product for biobased.

I think that that would minimize the risk of some of these false tradeoffs. But I think simplicity is key, but too simple may result in some misallocations of resources, or misallocation of priorities here. Thank you.

MR. BUCKHALT: Questions from here? Questions online? Steve has a question.

MR. DEVLIN: I guess the question I would have is related to this presentation and our previous presentation. Is there much in the way of coordination between industry associations on these kinds of activities? There seems to be a lot of good models out there. I'm just wondering how much communication in between industries, or between models there is.

MR. TRAINER: A little bit. We've never met before, but I've spoken to others at

BIFMA, and I've spoken to NSF, and so forth, so we're aware, very much, of what BIFMA has done. Likewise, for the residential furniture industry. We're in contact with them. There are important distinctions between our different audiences, if you will.

I think the BIFMA case, there you are selling to--your manufacturers are selling to building owners, building developers. The architects are specking the product, so that leads to one set of criteria. In our situation, our contract sales are sales to large hotels, or dormitories, or the government, represent about 10 percent of our market. Ninety percent of our market is residential.

So it's largely the spouse, the wife who is going in and making the purchasing decision, and so it's a very different set of purchasing criteria that apply there.

I think in the residential furniture area, it's probably a little bit

more of a mix there, but we do coordinate, but we do have very different audiences that we address, and we're structured very differently.

I don't know of many furniture manufacturers that make mattresses. I don't know of any that are involved in the business furniture. We tend to be somewhat of a silo, each of our industries.

DR. BOYD: I would agree. I think that's why--it just creates another reason for me, why the component level is the right level here. If we look at the flow of materials through our commerce, you start off with chemicals that become materials, and materials become components, and it kind of expands into the food web as you go out.

And in reality, when you get to the fabricated level, we're making different products, we're making different complex assemblies, but we're all using the same types of components, just in different ways.

But how we use that component, and how important that particular component is going to be for the greenness or sustainability of our product, is determined by what is it that I'm making and who's my audience. And therefore addressing it upstream at the component level--just this is another reason why they would make more sense to me.

MR. BUCKHALT: You guys want to talk a little bit about that downstream disposal, some things that are going on? Richard.

MR. DIAMONSTEIN: Just a few. One of the--and I do, I visit a lot of different Federal Government facilities. We work with different agencies. More recently, since the--and I've seen this happen a lot more since the executive order was issued in October. When I go in and I talk to a, you know, a procurement officer, and talk to them about the product that we've got available, the

green, quote, unquote, green mattress product that we have available, that's on our GSA schedule, the conversation inevitably gets to, well, if I buy these green products from you, what are you going to do with my used product?

And it used to be, you know, they would find an installer that would come in, install the mattresses that we would ship in, and then that installer would also take away the used mattresses. Well, you know the used mattresses end up in landfills, and because of health concerns, we don't bring used product back into our facility.

But there really wasn't a concern, as much of a concern about that in the past. What I'm seeing with this new executive order is that two out of every three people that I talk to ask me for a solution, end-of-life solutions. So they're looking basically cradle to grave.

You sell me a product that has less an impact on the environment, we also

want you to figure out a way to get that product disposed of, or the old product disposed of.

So in working, I actually, when I got, the first time I got this question, I called Ryan and I said you know anybody that does recycling? and I'm going to let Ryan, in a minute, just address some of the industry's efforts in the past, because we have had some significant efforts over the past 10 years or so, 15 years or so. But the traction wasn't there.

But now, you know, what I did, is that he gave me the name of recycler in a certain region, I called that recycler, they said okay, here's your cost per unit, plus you have to get it to me.

And in the past, you know, you would be able to tear it--get somebody to tear it down, and you're looking for somebody that will buy these and then pay you basically for the scrap.

But because the scrap market is not that vibrant, and is not going to give you the return, the recyclers will charge you a certain amount per unit, they will then tear down the product and sell off all of the scrap.

And when I went back to, when I've done two or three quotes on just, you know, taking the product way and having it recycled, there was very little resistant to the price. And I wasn't looking--I don't look to make a profit off of that. I look to do that as a service. And when I quoted the price per unit, there was not a whole lot of resistance to it. It's okay, that's great, we're interested, we'll let you know.

Well, I won't find out if it's successful until we get closer to the end of the Government year. But as far as oIngeoing projects that the industry has had, Ryan has been very involved in that process and I'll let him explain his initiatives.

MR. TRAINER: Okay. Right now, we just have around 15 to 20 recyclers around the country. Most of them are manual operations. Many of them are run by Goodwill, or St. Vincent de Paul, or other charities that are trying to provide job opportunities for unskilled workers. Most of them are relatively small. There is one in the Northwest, and then one in the Boston area, that does process more than a 100,000 units a year.

But for an industry that makes and sells new product, to the tune of around 40 million units a year, the current recycling network only handles a small percentage of what is actually discarded each year.

There are two new opportunities that we're involved with. One is trying to use a tire-shredding type of operation, type of structure, to process the mattresses, mechanically. Another one is based in the Seattle area, where it's an experiment using

prison labor to dismantle the mattresses. That pilot will begin, I think later this month.

It involves women inmates in some county institutions there, and it's a business that has been successful in creating small industries for these inmates in the past, and this is a new business opportunity for them.

So we're hopeful that that might provide a good model for other areas.

Our goal would be to provide, to help support a large-scale recycling operation in major urban areas, that we could really make a dent in this. But at this point, we're still trying to experiment with the right model.

Another issue that we're dealing with is the funding of these operations. The value of the recycled materials does not cover all of the processing costs. These are bulky products. They're expensive to handle

One option we're looking at is an

advance recovery fee that could be collected at retail when the product is sold and then that would be used to fund oIngeoing recycling operations.

Right now, the value proposition is, is that a plant will survive if it can charge less than what the tipping fee is at the local landfill, and landfill fees vary dramatically across the country, and that kind of a value proposition works only in a very small number of areas.

MR. BUCKHALT: Any final questions?

[No response]

MR. BUCKHALT: Let's give these guys a hand. Thank you, guys; appreciate it.

MR. TRAINER: Thank you.

MR. BUCKHALT: Our final speaker today, and then we'll take some questions, just general questions, and our other speakers, they're all here. We'll just have to figure out how we get everybody, and of

course you can see them speak when they answer the questions.

Jim Pollack is our last speaker. Jim's a very dynamic speaker. We've heard him on a number of occasions, speak about things that are "near and dear" to him, including life cycle. That's one of the things he likes to talk about. He and Ramani Narayan, you can get together and--

MR. POLLACK: Slug it out.

MR. BUCKHALT: Right. Yes. Slug it out. Okay. He's spent his entire career in the environmental profession. He worked for the U.S. Public Health Service, Dow Chemical and Dow-Corning Corporation, before joining Omni Tech ten years ago.

At Omni Tech, he's become a member of the Soybean Project Team, assigned to conduct environmental health and safety assessments of soy industrial products, and compare them to petro-based products. And we need more of that, Jim. Thank you for the

work on that.

In 2002, he and another Omni Tech colleague were appointed to the USDA NIST Biobased Advisory Group to update life cycle inventory data for eight agricultural commodities.

This was the beginning of the BEES model as it pertained to biobased products. So we were involved in that also.

Jim and his colleague were asked to update the soy agricultural database. Following that assignment, he began assisting companies in submitting their soy-based products to what is now our USDA BioPreferred program. He's been manager for several united soybean projects, including the development of a life cycle checklist for procurement, and updating the life cycle databases for soybean production and processing, and production of four soy-based feedstocks.

The information is now being communicated to a worldwide organization in

developing rules for biofuels.

So, please, Jim.

MR. POLLACK: Thank you very much, Ron. When I was given the title for this presentation, it just didn't say "life cycle," so I want to preface my remarks by saying my presentation is going to be talking about environmental analysis. And I've had to do this for many years in my career, and Steve asked me, draw on your experience in addressing this group regarding biobased products, and especially complex assemblies.

I represent the soybean industry; they fund a lot of my work, so I will use examples of that, when possible. But what are complex assemblies? And obviously my first comment was human beings are complex. But let's look at some of the specifics, and the previous speakers have covered these areas fairly well, about inorganic, organic and biobased. So I'm not going to dwell on those kinds of definitions, but somebody who's

previously said, complex assemblies are not homogenous, they are heterogeneous, made of many different materials.

So we look at environmental aspects and environmental impacts, and having been trained in ISO 14001, which is the international environmental management standard, they differentiate between an aspect and an impact. So what is an aspect? It's an element that can interact with the environment to cause an impact.

Emissions to the atmosphere are an environmental aspect. Water, effluent, solid, liquid waste, and natural resource use. So if we look at a little box, and I developed this back in my corporate days, when we were developing new products, and the problem was, back then, R&D would develop a product, and they'd throw it over the fence to manufacturing. No interaction between the two, and consequently, the manufacturing people say, Why are you giving me this

technology? It creates five pounds of waste. It's inconsistent with our environmental objectives for the site.

But what I ask people to do, whether it's in the soy area, or any area, cause I do environmental consulting for clients as well, is draw a box around your facility or your operation. It can be done on a unit operation. It can be done on a factory-wide site. And look at all the things that go in, all the things that come out, and all the things that go to the air, water and solid waste. And can you account for those? Sometimes, this is a challenge.

But if we're looking at the impacts--and again, this is related to life cycle assessment--we need to know what are the air aspects, and if you look at the impacts as defined by BEES, global warming, ozone, smog, criteria, certification of human health, you will see the measurements that those different impacts use, and these are all calculated by

putting in those inputs and then a computer model generates what those equivalents are based on a risk model developed by EPA.

So there are six impacts associated with air. Water quality has three--eutrophication, certification, ecotox. Natural resource use. Fossil fuel use, water, energy. Again, these are all measurable by using a life cycle assessment tool.

For this example, I just selected soy polyol, because as Ron indicated during my introduction, we updated the soy agriculture, soy processing, and creation of four key feedstocks, methyl soyate, which is also known as biodiesel, soy polyol, which goes into urethane foams, soy resin, which goes into durable plastics, and soy lube base stock.

As you can see, by looking at this block flow diagram, there's lots of information that's required, so that's why some people have a hesitancy to say, Why do we have to spend this much time and effort doing

an LCA? Because we have to look at all these different inputs, so that we can then calculate the outputs and determine our environmental impact score, be it for a biobased product or petroleum-based material.

So these are all the steps of just making--and the last box is carpet manufacturing, putting a urethane foam backing on a carpet. So it's not the total. The carpet is a complex assembly because it's got multiple things, it's got the face and got the backing, like previously here discussed. So how does one analyze for all these aspects and impacts, and do it in a simplified manner?

One, you can have an individual do it, or a group of people, and this can be somewhat subjective, because how does one rank aspects and impacts by importance?

Several stakeholders groups have attempted to do this, and they put global warming as number one, and some of these others down as number six or seven.

The choice, really, is the user of the material to determine what they feel is the most important impact. For me to say global warming's more important than fossil fuel depletion, that's Jim Pollack's opinion, and I don't think I should impose my opinion on you in this kind of situation.

You can have a checklist, and as Ron indicated during the intro, a year and a half ago, Linda Maceros and I put together a two-page checklist that was meant for Government procurement people, to look at various aspects of a product, and how they would perform, and I'll show you some of those in just a moment.

But a checklist can be somewhat subjective cause it's one's opinion, and when I was at my last corporate employer, which was a specialty chemical producer, we didn't try to quantify the aspects or impacts versus present. What we said: Is it better, or less than, or equal to what we're doing now? If

we're manufacturing a product, say a chemical resin, and all--going back to that box--are the inputs more costly? Are they more toxic? What are the human health aspects of those materials?

Because we have to sell the customer, saying this is new and improved. Is it really new and improved? We have to have some facts to substantiate that.

Modeling tools. They're less subjective, peer reviewed, but more effort to implement. And then we have a carbon analysis, which you heard a very detailed description this morning regarding an estimate for C02 and fossil fuel replacement, and Dr. Ramani did indicate--or Dr. Narayan said no energy C02, though, is taken into account when you just do the carbon footprint.

So is that really an overriding factor or not? The decision would be up to the user. But I looked at an example, looked at a bookcase example, all metal, all wood or

composites, and again, the biobased components could be the adhesive and the coating. Could be--both of those can be biobased. So why would they make me a more attractive choice to someone making a choice on a bookcase.

Then again this has an error in it. I apologize. Wood is not counted as a new carbon source, so please disregard that. But again, the biobased content would show the adhesive and the coating as the new carbon. This type of item can also be life-cycled modeled and compared to a non-biobased bookcase. Or a check list could be used. Typical checklist questions, yes or no type questions.

Will the item emit more or less VOCs? So how does a person determine that? Again, by maybe looking at a material safety data sheet for the material, the adhesive or the coating on that item.

Has the item successfully been used at other locations by the Government?

Is the biobased content higher than competitively-performing materials?

And again, I threw in a safety perspective too. Are there known, perceived, or real safety benefits of using the biobased item? And can the item be recycled?

So those are a type of checklist. The two-page checklist has more questions, yes or no type questions on it, but these were the ones I thought might be of interest to you.

Now can modeling be used for complex assemblies? We've heard, you know, Path A, Path B, today, options for--it was yes, it can be used for either modeling the variable portion of the complex assembly or the entitled assembled items. And we heard the pros and cons of both of those. And again, there's the example--do we just model the foam, or upholstered portion of the piece of furniture versus the whole item?

I would probably say model the

biobased portion, or the upholstered part.

So, in summary, for analyzing environmental aspects of a complex assembly, you have two choices, and again the biobased carbon content technique can provide an estimate for a carbon footprint. But again, it doesn't provide the carbon impact for energy used to produce an item or its feedstocks.

A checklist can be used as a quick assessment or screening tool for evaluating and comparing aspects and impacts of competing products. And again, LCA is the only comprehensive tool to quantify the energy usage and the environmental impacts throughout the production and use of any product. So what's my recommendation?

Pilot an analysis process for selected complex assembles with and without a biobased component, using those three analytical tools, and see how it works, and whether that could be an initiative of Iowa

State, or someone else. It might be worth a try. Test drive it before you buy it.

Examine the findings to one, ease of use, value of the information you derive from that, and the cost to implement that little screening process. And also to look at impact importance. Let the procurement person choose whether they think global warming is the overriding factor, or energy usage, or fossil fuel depletion, or one of the other impacts.

That's it.

MR. BUCKHALT: Okay. Thank you. Thank you, Jim. We're ending earlier, right now, than we anticipated. Why don't we have some questions. Lots of questions. But Steve, you have something again? Okay. Did you have a question, Steve? And there comes Jessica with a microphone. Here's a question from this Steve. Here we go.

MR. DAVIES: I had a question. And it's Steve Davies, NatureWorks. This

seemed like you were focused, in this presentation, on environmental benefits analysis of complex assemblies, and not the simpler case of biobased labeling. It's almost like we've reverted back to the January 5th meeting, where is it a content label only, or it is a green label where you have to really understand the environmental benefits?

And I guess I want to be clear on that. Maybe you don't yet know, from a USDA perspective, Ron, what were the results of the January 5th meeting?

MR. BUCKHALT: Okay. Jeff has a word to say on that, and we just don't look at all aspects, I'll tell you.

MR. GOODMAN: I don't think--we don't have--well, first of all, we're still accepting comments and we're still trying to think about this. So I think it's fair to say we have not yet begun to really wrestle with this really hard. We're still kind of in the--if you think about the decision making

process, in sort of the block flow way that Jim talked about, we're just looking at the arrows going into the box, and we're not yet really inside the box, wrestling with what to do yet.

But I think one of the reasons that we wanted to have this discussion, at this point, is that as we think about how to designate complex products, it may be that because I represent some different challenges from the simpler products that we designate, that we might want to think about in our program guidelines having, not necessarily being wed to the same exact life cycle assessment approach for complex assembly products as we are for the other products, and so some independent thought about what would life cycle assessment look like for these kinds of products, is something that could be an important part of our program guidelines.

MR. POLLACK: And just to add, with the new soy life cycle information that

we now have, if someone wanted to model polyurethane foams made with a soy ingredient, we now have that updated platform, so the modeling cost would be less rigorous to the modeler and less costly, and we also of course have the life cycle results for the petro-based foam, and that was done simultaneously with that.

So USB did provide the funding to model both the biobased product and its competitive hydrocarbon-based product, and that was done for the four feedstocks. And again, that report is publicly available on soybiobased.org. Or I can send you a copy if you give me your card, for those in attendance. Yes, Dr. Narayan?

DR. NARAYAN: Just on these LCA, which is--I think the way you have it, which I thought was pretty neat, is calling it--using LCA tools to report on a set of environmental criteria, and then maybe the USDA should define a set of criteria which are impact

categories they're going to select, and maybe, on a simplest level like you say, a checklist, yes, it meets the require--it is equal to what the process is today versus then synthetic way of making it. Yes, it is, no, it is not, or all those impact categories would be an easier analysis to do, not necessarily the best, but an easier analysis to do, which could move things, at least I feel, in a easier way, than to go to the actual numbers and then say what are the boundary conditions, and all that.

So that's one I would like you to comment on. But add on to this--this issue about transportation, because most of the LCAs I see is, depending on where you move the stuff back and forth, that transportation impact can totally wipe out some of the other numbers.

In other words, then you're not comparing apples to oranges. So is there a way, like using your checklist kind of a thing, you could come up with, say, just

compare the process to manufacture, not what it takes to transport, not, because these are all subjective variables?

Can we do something like that? Then we could even make it into a standard which everybody follows.

MR. POLLACK: Well, this obviously could be a template, and you could modify this checklist to incorporate the transportation issues. This checklist was developed for the actual end-user, so it's not a real technical checklist.

But it's more in the hands--if I were going to buy, go to a supermarket and buy this can of soup versus this can of soup, what's my checklist criteria for buying that can of soup? So I don't know if that answers your question or not. And again, the transportation issues are covered, if you do an LCA. At least in our study, we did transport distances.

DR. NARAYAN: But it depends on

where the stuff is shipped--that depends on where the stuff is shipped from. So if I--you know--say if I'm shipping it from Nebraska to California versus saying I'm shipping it from Saudi Arabia to that--

MR. POLLACK: Well, you could give a greenhouse equivalent for so many hundreds of miles, for example.

DR. NARAYAN: Yes.

MR. POLLACK: Because we did that for our European analysis on biodiesel.

DR. NARAYAN: Yes. That's where I said it gets a little complex.

MR. POLLACK: Yes.

MR. BUCKHALT: And Jim ought to put that checklist together for federal procurement officials, so they can't say no. You know, there's a reason not to say no. That's what that was about. This is do these things and you can say yes.

MR. POLLACK: Yes. It helps them justify their decision; correct.

MR. BUCKHALT: Steve?

MR. DAVIES: Just one last comment. I enjoyed your presentation and agree totally with the rigor of that approach, if you want to really nail the benefits piece of the biobased. But still, for what it's worth, our strong recommendation would be complex products or simple products, that we keep the BioPreferred to be content only and leave aside, to the marketing people, how they claim and how they back up their claims with tools like this, and not significantly, in our mind, complicate a pretty clean biobased label, content label, with--don't try to make it into a green label. I said the same thing in January.

Keep it very much as Vinçotte, "Vincotte," however it's pronounced, in Europe, has done. Our two cents worth. Thanks.

MR. BUCKHALT: Content only. Thank you.

DR. BOYD: I guess this is more of a comment, Jim, and then you can correct me, am I right, I guess in making the statement. If we're doing an LCA on a complex assembly, the process that you'd be following anyway would be kind of de-engineering your complex assembly into it, you know, into its hierarchy--its subassembly, its components, its materials, and then you'd be following an individual LCA, you do an analysis on each one of those flows that came into your product.

So if I use the diagram--it's at scale already, so--and the picture that you showed of the soybean--I mean, what it was telling to me was that that gate-to-gate assessment would be the same for every complex assembly that came up downstream, because you had done it up to the point that it was a soy-based polyol waiting for molding operation. And that LCA would exist now, it's like an embodied LCA for that soy-based polyol.

So therefore, if I'm a complex

assembly manufacturer now, if I use that soy base, that polyol in my mattress, or I use it versus foam for my seating, the LCA impact up until that gate is the same.

MR. POLLACK: Yes.

DR. BOYD: And then the final LCA would be based on my final, you know, contribution that I make; right. So again it goes back to this idea of it's the components that really are important, because the LCA, the majority of that LCA work is gate to gate. It's the same LCA, so these considerations, these impacts, are the same for every single complex manufacturer that's going to use that soy-based polyol.

The only difference is that external piece that I add to my particular application.

MR. POLLACK: True. Yes. Because the use and end-of-life considerations are going to be fairly comparable for the petro-based material versus, you know, the biobased

material.

And again, you have your choice of whether you just wish to model the biobased fraction of that, let's say seat, versus, you know, petro-based seating component, because the wood, the metal, you know, the plastic-- those all might be the same for either assembly.

So why spend the time and money doing that? Just do the variable, being the biobased versus the non-biobased component.

DR. BOYD: To summarize it, the LCA on my complex assemblies is the sum of the LCA and the components, plus the fabrication energy that I put into it.

MR. BUCKHALT: This leads to what's happening on April 1st. On April 1st, we'll be talking about the intermediate materials, what it takes to get it to the final--

MR. POLLACK: Yes; feedstocks.

MR. BUCKHALT: --the first stage,

the second stage of the processing, the manufacturing process, not the preparation. To get the chemical ready to make something with. So that's what we're talking about.

DR. BOYD: Well, would it be correct for an LCA protection inspector to say that it's likely that--and it's probably case by case--but how correct would it be to say that most of the LCA impact is going to be that gate-to-gate piece, irrespective of how that piece is then incorporated into the complex--

MR. BUCKHALT: In the majority of cases, that would be true.

DR. BOYD: Majority of the cases. Now granted, that for a automobile, that a significant aspect may be the use of the automobile, its fuel and what have you, whereas a chair, there is no energy associated.

MR. BUCKHALT: sure.

DR. BOYD: But besides the use

phase of the life cycle, everything upstream is really locked in mostly before the OEM actually fabricates the final product.

MR. BUCKHALT: It's true.

Yes, Dr. Narayan.

DR. NARAYAN: Sorry, I would beg to differ on that. The reason is that yes, if everybody is honest, and say is okay, the polyol, as Jim has done, with the same inputs and outputs--correct. But that's where the problems come. I'll give you a classic example.

Recycling of paper, if done right, does give you a value proposition in terms of the LCA. But if I took it to China, shipped it over there, didn't have any controls, let the water go into the Yangtze River, and then sold it at a price, saying this is recycled paper, because I used an LCA that Jim has provided me--right?--then it's absolute cheating. And if you think that doesn't happen--it always happens, at least in the

biodegradable world, I can give you example--

MR. BUCKHALT: You have to have consistent boundary conditions.

DR. NARAYAN: Exactly. And that's where the--so it's a question of somebody has to actually check and validate that thing. So taking a polyol and saying, okay, I am doing this part but I'm not checking where the polyol came from, then it becomes a problem. That's where the issues come up.

MR. POLLACK: That wasn't what I was trying to address.

DR. NARAYAN: No; no.

MR. BUCKHALT: Do we have any more questions online? Anybody? Any last minute--do you have stuff like that? Jessica, we can address it to anybody who's here. Go ahead.

MS. RIEDL: First question. This came up during Ramani's presentation but we didn't have enough time for questions at that time. How does locking up fossil carbon into non-degradable plastic cause release of C02?

MR. BUCKHALT: That as that question that I handed to you that you didn't answer.

DR. NARAYAN: Can you repeat that question again.

MS. RIEDL: How does locking up fossil carbon into non-degradable plastic cause release of C02?

MR. BUCKHALT: It doesn't.

DR. NARAYAN: It doesn't. If you can guarantee that it is locked up and never released into the environment like in a landfill, then it won't be released. But if you did it that way, even if it is a biobased product, it won't be released either.

However, when you make the biobased product material, you are using up C02, which didn't come from the fossil phase, so you're negative C02 impact, and so it depends where you draw the baseline. You can either say zero and release C02, or you say I'm zero and therefore I'm negative C02. So

take your pick is what it is.

MR. BUCKHALT: It is the same question. I think the other one had landfill on it. But it's the same answer, basically.

Any more, Jessica?

MS. RIEDL: Can a plastic product that's a mixture of petro and bio- plastic be recycled?

MR. BUCKHALT: Petro and plastic? Yes.

DR. NARAYAN: Absolutely. Coca-Cola is the sample. They are taking PET and making bio PET, and the concept is--as far as any chemistry goes on that, there is no difference. It's the same molecules. So you can recycle it, you can do whatever you want with it, whatever you did with regular PET.

MR. BUCKHALT: So it's not a detriment.

DR. NARAYAN: It's not a detriment to that. Polyethylene, for example, is bio-polyethylene, and petro polyethylene. You

couldn't tell any difference. It can be processed and recycled the same way, irrespective of what it is.

MR. BUCKHALT: But you're talking about the same end product. I think the question goes to when you've got a petroleum component and you've got a PLA, particularly component, and how much can you--yes?

DR. NARAYAN: Well, if the question is I have a blended component, or a mixture of components, it will be hard to recycle. But that is true, even if I have two separate petroleum components which I mixed up. That's also equally hard to recycle.

So yes, it's difficult to recycle, but it doesn't matter if it is bio or petro. Whenever you have a blend, or a mixture of components, it is going to be difficult to recycle unless it's separated.

MR. BUCKHALT: Jessica.

MS. RIEDL: Why should we ignore end-of-life recycling and composting, since

biobased plastic products can have an adverse effect on the current recycling system?

DR. NARAYAN: So the question is if you decide that your end of life is going to be recycling, then, okay, then it doesn't matter whether it is bio or petro. There are, like I just explained, I can make bio-polyethylene, which is biobased, but it can be recycled, similar to that, and if you have PET, it's the same way.

If you take PLA, which is where I think the question is more or less coming from, then it's clearly a volume issue. There's not enough volume, then recycling becomes a problem. But that's changing.

So I think in a free market economy, the customer decides which products give him the best environmental value proposition, and end of life and where it makes sense for compostability and biodegradability, the end of life is important.

I don't think that in these discussions, we have eliminated end of life. It is there. For example, even in the BioPreferred program, products which are definitely going into a composting infrastructure, for example, the BioPreferred says it must be fully biodegradable and meet an ASTM standard. So it's there. So it does not discount end of life. Where recycling is happening, then this should not interfere in the recycling. I think it's in there.

All we're doing is we're not mixing it up and deciding what is biobased, and how do you measure the metrics towards the end of life towards that.

MR. BUCKHALT: That's right. One more here.

MS. RIEDL: Is PLA on the BioPreferred list?

MR. BUCKHALT: Yes. Products made from PLA are. It's a feedstock. We've got the bottles that are made from PLA.

Steve?

MR. DEVLIN: At this point we have no, what I would consider an intermediate material designate.

MR. BUCKHALT: Right. I agree with that.

MR. DEVLIN: So we have end-use products that use PLA.

MR. BUCKHALT: Right.

MR. DEVLIN: They have end-use products that use other types of biobased polymers, and so I guess, from that standpoint, we do not have PLA as a BioPreferred product at this point. But there are products on the list that do utilize that.

MR. BUCKHALT: Correct. No, I agree with you. That's the intermediate ingredient, that's the situation, the question we need to discuss in a month from now, April 1st, at Iowa State, the intermediates and how we designate intermediates. Correct. The product's been designated but not the

feedstock, at this point.

MS. RIEDL: I have one more questions right now. It's from Antonio Galvez. How long does it take to place a government law to rule this change, to use biobased carbon to replace that old carbon? I think this change should take a big government effort and a complete understanding of the simple chemistry into all industries of complex materials.

MR. BUCKHALT: All right. Who wants this one? Jeff?

MR. GOODMAN: How long does it take to pass a law? I mean, this is a complicated political question, not really related to implementation of our program. Where there's a strong political will, Congress can act quickly to enact laws. Where there's a strong difference of opinion, laws don't get enacted.

So I don't know that there's necessarily the political will to have a

sweeping law, as the questioner suggests, and so I don't see an easy way to put a timeframe on that.

If there were such a law, how long would it take to implement it? It would be, you know, a number of years, hopefully not a large number of years.

DR. NARAYAN: But I thought--I mean, I don't understand the question in totality, but there is a law which requires procurement of biobased products by the Federal Government. Right? I mean, that's still in place.

MR. BUCKHALT: She's talking complex products.

MR. GOODMAN: There is a law that requires that federal agencies give a procurement preference to biobased products. But there is no law that requires that petroleum products be phased out and requires that only biobased products be made. Some might argue that that would be a restraint of

interstate commerce, and there could be all kinds of constitutional questions about such a law.

MR. BUCKHALT: Sounds like we're getting down to the weeds here. So let me thank everybody for coming, for participating. Jim, you were the last speaker. Thank you very much for your insights.

MR. POLLACK: Thank you.

MR. BUCKHALT: Make you turn your microphone there off while we're still on the air.

MR. POLLACK: I just did.

MR. BUCKHALT: All right. Again, folks, thanks for coming, and all of you folks who've been online, we appreciate your questions. Oh, thank you. Yes. My colleagues have said submit comments. Sixty days, please, if you have comments on what was said today here. If you want to say something different, you disagree or agree, we'd love to hear from you. BioPreferred.gov. Just submit

your comment. It's a fairly easy Web site, and there's a little place there you just click and submit comments, and just note that you're commenting on the complex products initiative, and we'll be able to have this again a month from now, as indicated, on intermediates.

And those of you who have not yet submitted your comments on our January 5th meeting, where we talked about LCA, as we did again today, please also submit those comments.

So anything else you would like to talk to us about, we do answer e-mails, we do let you know we got your mail. So please let us hear from you. Again, thank you, everybody. We appreciate it. Thanks much.

[Whereupon, at 12:22 p.m., the seminar was concluded.]

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